

THE IRON AGE

A Review of the Hardware, Iron, Machinery and Metal Trades.

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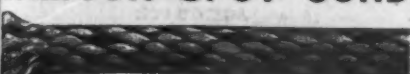
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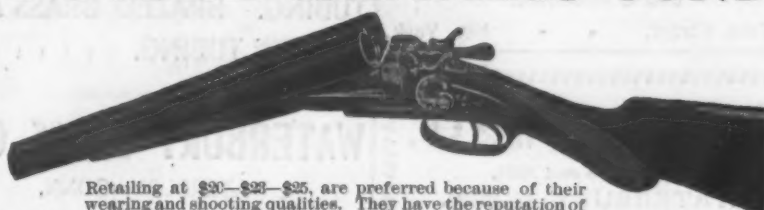
SEE ADVERTISEMENTS

PAGE 26

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THE IRON AGE

THURSDAY, JANUARY 14, 1904.

Rapid Machining of Crank Shafts.

Advanced Methods Employed at the Eddystone Works of the Tindel-Morris Company.

II.—FINISHING OPERATIONS.

In the production of finished crank shafts, it has been found most expedient to divide the work into two distinct series of operations; the aim of the first being to remove the bulk of the superfluous metal in the shortest time possible, only approximating the ultimate dimensions, and that of the second to obtain the finished sizes along the lines of the greatest speed, but without sacrificing accuracy in favor of dispatch.

These are termed the roughing and finishing opera-

and the torsion of the shaft when driven in an ordinary lathe from one end present an almost insuperable difficulty to correct lining up. It is claimed that no system of face plate appliances will overcome these obstacles to true running—sag and torsion—and that with the employment of the most ingenious face plate appliances the engine lathe cannot bridge over the gap between the live and dead centers to keep the shaft straight, nor is it possible to obviate the pulling of the face plate end

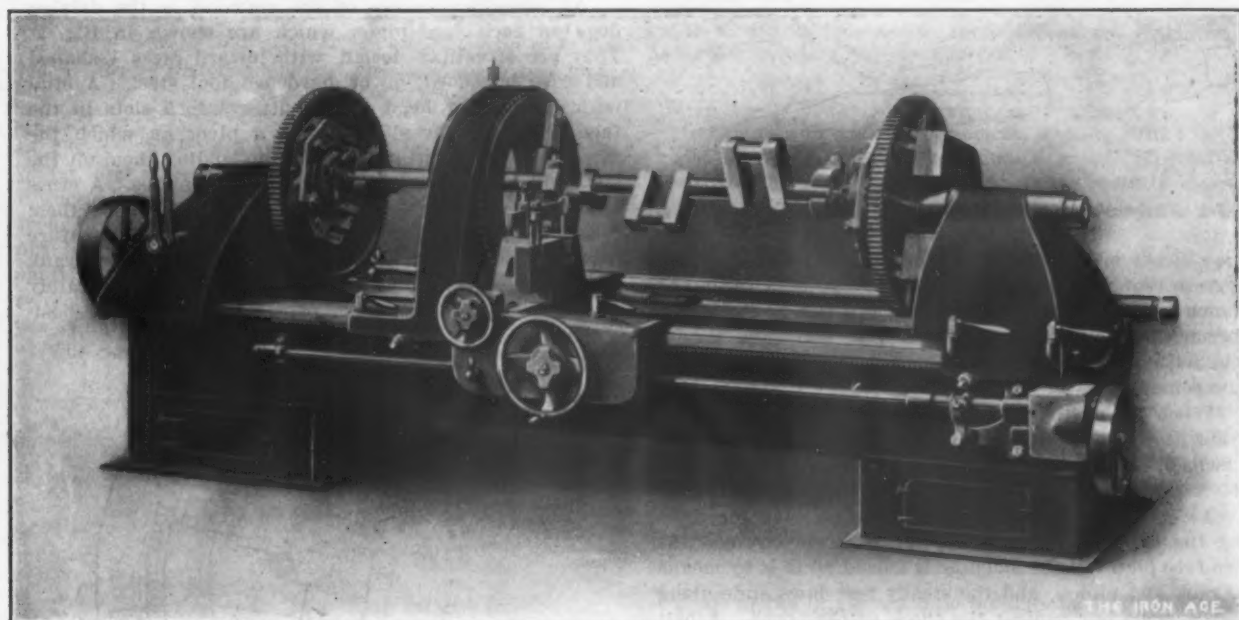


Fig. 1.—The Tindel-Albrecht Crank Shaft Lathe.

tions. The former were illustrated and described in our last issue. In the case of the latter the problem resolves itself simply into the use of a lathe with changeable centers and so constructed as to permit the speedy manipulation of the mechanism attaining this end.

Such a machine is the Tindel-Albrecht crank shaft lathe. In the finishing of shafts having multiple throws with the crank pins fixed at angles to one another, the quick changing of centers of the lathe is particularly desirable. Crank shafts of this type have come into widespread use with the development of the gas engine, motors for automobiles and launches, and the smaller sizes of steam engines for electric power and lighting.

After the rough cutting has been done the problem of getting the finishing true is a difficult one. The crank pins must be true with the main bearings of the shaft or the piece might as well be thrown into the scrap heap. Here is where the difficulties of crank shaft finishing manifest themselves. Not only is trouble encountered in the shifting and correct setting of the different crank pin centers, but when these are obtained there is still the baffling problem of getting a true running of the crank pin while turning. The sag of the piece through the throw slots

of the shaft and the dragging of the tail stock end and thus forcing a torsion through the piece.

The Tindel-Albrecht crank shaft lathe is claimed to overcome these difficulties primarily because of its center drive, the sliding jaw chucks of which hold the shaft by the cheeks of the throw or at the nearest point possible to the crank pin being turned. A general view of the machine with a three-throw shaft in position is shown in Fig. 1.

The machine turns every part of the crank or eccentric shafts or crank axles, including journals, crank pins and crank arms; all from the main center. Instead of the centers being fixed in the spindles, as in the ordinary lathe, they are carried in slides, one of which is placed on each end of the lathe, which, by means of screws working through nuts in the backs, move the centers in and out to any desired distance. This mechanism is shown in the sketch, Fig. 2. In this way the shaft, having been first hung by the journal center holes on the machine centers, which have been adjusted by the screws to zero on main center of the machine, is shifted out of the journal centers into line with those of the crank pin to be turned.

Graduated scales on each slide give the exact measurements, and dowel pins pushed into matched holes through slides and face plates confirm the scales and guard against any possibility of error.

Each shift from journal centers to crank pin centers is accurately and quickly made by means of the face plate slides. From the crank pin centers to the journal centers a return is made in the same manner.

In shafts having more than one throw each crank pin is successively brought into center for turning without any further adjustment of the centers by merely turning the shaft around on the centers already set, by means of graduated circular plates fixed on the slides. The shaft as it hangs is simply revolved the number of

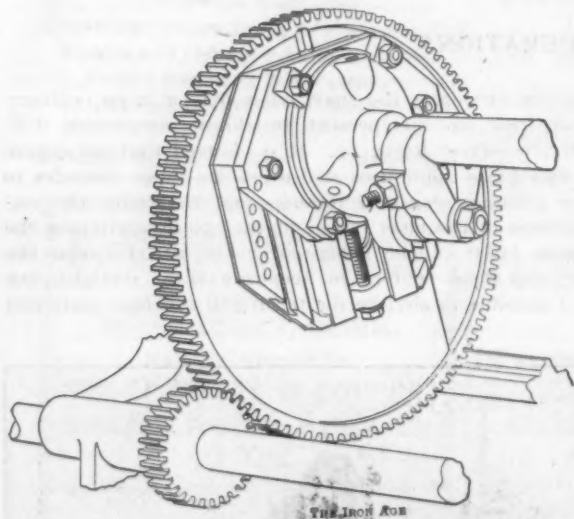


Fig. 2.—Mechanism of One of the Slides by Which the Work is Shifted to the Desired Centers.

degrees required to give the angle of the next throw, as shown by the graduated scales on the rim of the disks, corroborated as before by dowel pin, and thus simply and without any other shift each crank pin is brought into center.

When all of the crank pins and other parts of the crank throws are finished and it is desired to finish the journals, the slides are again brought down to zero on the scales. The journals are then in line for turning.

As each crank pin is brought into position for turning the driven steady rest or center drive between the two face plates of the machine is moved up to it by means of rack and pinion, and the steady rest jaws slide along the carrying bar against the cheek of the crank. A bolt through the lower ends of the jaws is then tightened up, giving them a firm grip close to the work, to prevent any vibration or springing. This supports the work close to the edge of the cutting tool, as shown in Fig. 3. It permits the taking of very heavy cuts on the rough crank pin with a broad nosed tool. The steady rest is moved from pin to pin until all are finished. To insure true work the steady rest housing is made very heavy and rigid, and fitted with extreme care. In finishing the journals they take the place of the pins in the steady rest, the spaces between the crank throws being relatively in the same position and supported by the jaws in the same way.

The steady rest and each face plate are driven at the same speed simultaneously by means of pinions keyed on the driving shaft at the back of the machine. These are shown in Figs. 2 and 3. To insure smoothness of running and avoid any possibility of back lash in the gearing the gear pitch at the steady rest is varied from that of the face plates, being made coarser. As the strain of cutting down crank pins falls directly upon the steady rest the advantage of this is obvious. By this system of driving any possibility of torsion of the work under the strains of cutting is entirely eliminated. No difficulty is found in keeping any number of crank pins in the same shaft in strict alignment which the users of this lathe have found impossible in any form of fixture applied to

the ordinary lathe where only the face plate end of a shaft is driven.

A long bearing is provided in the steady rest housing for the driving ring, which prevents vibration and insures steadiness of running at high speed. The bearing itself is a split tapered bushing capable of being taken up by a large nut fitted into its back end. This nut is operated quickly through a slot in the housing. Lubrication is effected from a sight feed oil cup fixed on the top of the housing, suitable oil ducts being cut in the wheel bearing.

The work is held in the steady rest by two forged steel jaws, made to slide loosely in and out along a stiff rectangular cross bar, Figs. 3 and 4. The bar is set upon the studs at either side of the driving ring and held down by the nuts. It is removed when changing from one crank pin to another to allow the passage of the crank throws through the wheel, and replaced when the rest is again in position. The holding jaws are slid by hand against each side of the crank cheeks, and firmly locked by a bolt passing through each on the lower sides and close up to the work. When bolted to the work the jaws are firmly held in position on the cross bar by large set screws let through the jaw sockets on the top of the bar. This arrangement makes a firm driving hold close up to the cut, in attaching which there is no possibility of springing the work. The shifting from journal centers to pin centers, and *vice versa*, finds the jaws always in position to take hold close to and in line with the cut.

An essential feature of the machine is the driving dogs on each face plate, which are shown in Fig. 2. They are of caliper design, with inward faces V-shaped and case hardened, or of hardened tool steel. A stud with rectangular head closely fitted into T-slots in the face plate circular slides forms a pivot on which the jaws open and shut, an outside nut holding them on the stud and in a fixed position on the face plates. A cross bolt passing through each jaw below the V's bolts them firmly to the work. These dogs are an essential feature of the lathe. By their means in multiple throw crank shafts the several pins are successively and accurately swung the requisite number of degrees into proper posi-

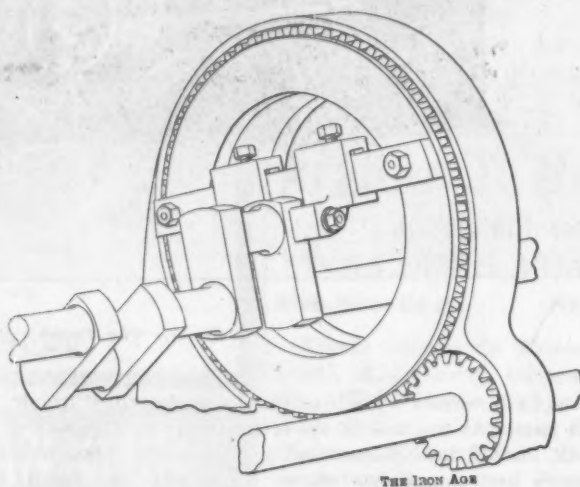


Fig. 3.—Center Driving Mechanism with Work Properly Clamped.

tion for turning through the revolving of the circular slide on the face plates to which they are attached. After being set and fastened for turning the crank pins, they are not afterward touched until all the pins are finished, the angle of the pins being obtained by a revolving movement of the circular disks previously referred to.

The tool slide, as shown in Fig. 4, is of special design, having on one side a stout tongue made narrow to slide into the throw of crank shafts to support the cutting tool close up to the work when turning crank pins. In shafts of unusually deep throws a post support for the tool is provided also, which can be adjusted in and out or up and down close under the end of the cutting tool, and effectually prevents any springing and "digging in." The tool slide swivels bring a broader faced side

into use when the large surfaces of journals are to be finished.

Nice finishing necessitates rapid and even running. To secure this, accurate counterbalancing is most imperative. This is done on the backs of the face plates, where it does not interfere with the other operations of the machine. The balance weights are divided into units, sufficient, when all are used, to poise the largest crank shaft up to the capacity of the machine, as shown

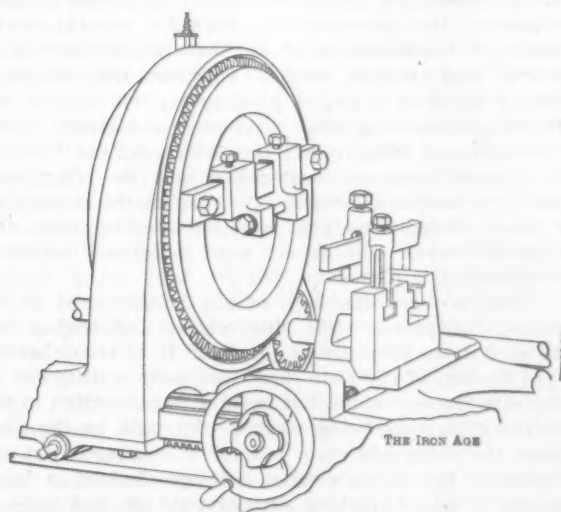


Fig. 4.—Center Driving Mechanism, Showing Sliding Jaws Used in Clamping Work.

in Fig. 5. They are divided equally on the two face plates, and nicety of accuracy of balance is obtained by a further provision of sliding the weights toward and from the center. To insure balancing, the operator slips out the driving pinions of the main shaft, so that the shaft, after being set in the machine and locked, can be swung free and the counterbalance weights then set until the swing is balanced.

The capacity of the machine is measured by the diame-

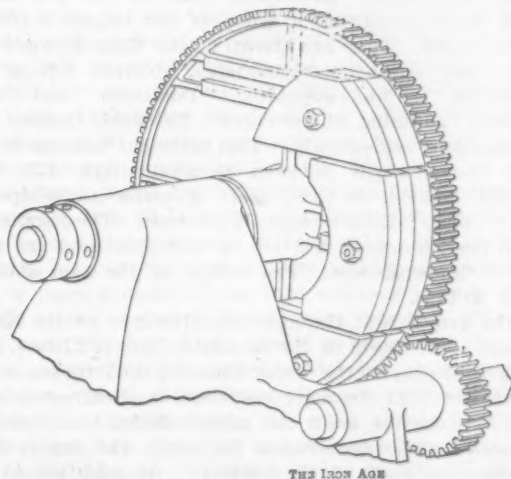


Fig. 5.—Rear View of End Driving Plate, Showing Movable Weights for Counterbalancing.

ter of the opening in the center drive or steady rest, which in multiple throw cranks must be of area sufficient to allow of the passage through of every crank throw as the rest is moved forward to each crank pin. Consequently the less the sweep of the throws, the smaller need be the area of the opening in the rest; for instance, a double throw crank shaft with crank pins set at an angle of 180 degrees requires to be handled in a larger sized machine than the same sized shaft with pins set at 90-degree centers. At present the machine is to be built in four sizes, having center openings of 12, 17, 28 and 45 inches, respectively.

The International Fire Engine Company Bankrupt.

At Trenton, N. J., Vice-Chancellor Emery has appointed James Russell Clarke of New York and Charles E. Kimball of Summit, N. J., receivers for the International Fire Engine Company, a \$9,000,000 corporation, with plants in New York, Baltimore, Chicago, Cleveland, St. Paul, Elmira, N. Y., and other places.

The receivership, it is stated, was a step taken solely with the idea of protecting all the creditors of the corporation. The success of the reorganization plan having been assured by the deposit of 80 per cent. of the preferred stock and 68 per cent. of the common stock, there remain only the actual payments of cash in response to calls from the committee to complete the raising of \$500,000, necessary to take care of all of the debts of the company and to provide sufficient working capital. The first call, it has been announced by Sullivan & Cromwell, counsel for the Reorganization Committee, will be sent out in the near future.

Of the two receivers, Mr. Clarke has been president of the International Fire Engine Company since last August, and is quite in accord with the representatives of stockholders and creditors on the Reorganization Committee. Mr. Kimball has had no previous connection with the company. In the application for a receiver it is stated that the liquid assets of the company are \$95,250 and the total receivable assets are \$176,523.16. The liabilities of the corporation are \$347,294.07, and the value of all of their assets, including plants, machinery and stock in hand, is over \$500,000.

Germans Contract for American Rolling Mill Plant.—The Morgan Construction Company of Worcester, Mass., through their London agents, have recently closed two important contracts for Germany, making three contracts which the company have taken for Continental concerns in the past year. One contract is for the Rheinische Stahlwerke, Meiderich, near Ruhrort, Germany, and is for a rolling mill for merchant bar, to be practically a duplicate of the mill recently furnished by the Morgan Construction Company to the International Harvester Company at Chicago. This mill will have a capacity of 100 tons a turn. The other contract is for the well-known Gewerkschaft Deutscher Kaiser, at Mulheim an der Ruhr, Germany, and is for a plant for rolling hoop continuously. Its capacity will be from 50 to 100 tons a turn. The contract includes the plant complete, from the heating furnaces to the shears.

Some of the larger machine builders have adopted the positive blue print for use in their drafting rooms and are very much pleased at the result. Instead of the white lined drawing on a blue background, they have a white background and blue lines. This is accomplished at small expense by means of what is known as negative paper, which is printed from the tracing, the result being a white lined drawing on a deep brownish-gray background. This background is opaque, while the white lines are very transparent. All subsequent printing is from the negative paper, the tracing being discarded for the purpose. This new blue print is of especial value as a substitute for original drawings, which may be preserved in their freshness. Excellent prints may be obtained as a substitute for the ordinary blue prints to send to prospective customers. For shop use, however, the old blue print is considered the better, because the blue background soils less easily and it is more easily read after being shop handled.

The creditors' committee of the Acme Harvester Company, Peoria, Ill., against whom bankruptcy proceedings were recently instituted, after a thorough inspection of the property, has ordered the works to resume operation January 25, after a shut down of several months. Employment will be given to 700 operatives. It is now believed all claims will be settled without forcing the institution into bankruptcy.

Shipbuilding Records in Scotland.

GLASGOW, December 24, 1903.—The Clyde shipbuilding returns for 1903 show a large decrease in the tonnage launched. In 1902 the output was 312 vessels, of 518,270 tons, and in 1903 the total so far returned is only 260 vessels, of 454,739 tons, a reduction of 63,531 tons, or about a month's work. This is perhaps not so large a reduction as was anticipated, but the yards were largely employed during the year in working off contracts booked during 1902. The coming year will show a still greater decrease in the tonnage launched. In many of the yards work is now very scarce. The returns from other parts of Scotland are not yet complete. On the Clyde we have some 50 shipbuilding yards, and the following shows the vessels launched by each in 1903 and 1902:

Builders.	1903.		1902.
	Vessels.	Tons.	Tons.
John Brown and Co., Limited.....	6	55,152	26,260
Russell & Co.....	13	45,810	55,585
Fairfield Company.....	8	39,053	30,300
Charles Connell & Co.....	7	28,908	41,052
Wm. Denny & Brothers.....	20	30,472	40,329
Alex. Stephen & Sons.....	3	23,612	27,826
Barclay, Curle & Co.....	5	20,944	31,280
Scott & Co.....	6	20,195	13,894
Caird & Co.....	2	19,005	11,024
D. & W. Henderson & Co.....	11	17,989	39,849
A. Rodger & Co.....	7	17,643	12,721
Napier & Miller.....	5	14,362	18,708
Wm. Beardmore & Co., Limited.....	1	10,700	15,258
London & Glasgow Company.....	1	10,700	13,835
W. Hamilton & Co.....	2	9,753	9,941
A. McMillan & Sons.....	3	9,353	17,055
Alisa Shipbuilding Company.....	10	8,120	9,919
Wm. Simons & Co.....	8	7,250	8,050
Clyde Shipbuilding Company.....	3	6,246	5,103
Grangemouth & Greenock Company.....	5	6,241	12,404
Lobnitz & Co.....	12	4,534	1,240
Campbeltown Shipbuilding Company.....	3	4,509	3,204
Fleming & Ferguson.....	9	5,829	6,400
Mackie & Thomson.....	13	5,242	4,193
A. & J. Inglis.....	2	4,301	10,875
Scott & Sons.....	9	2,679	1,228
Alley & McLellan.....	22	2,608	3,157
John Reid & Co.....	2	2,511	5,951
Murdoch & Murray.....	4	1,750	6,083
George Brown & Co.....	6	1,694	900
R. Duncan & Co.....	1	1,608	15,613
John Fullarton & Co.....	4	1,500	2,818
Ritchie, Graham & Milne.....	14	1,310	2,346
Irvine Company.....	2	1,256	153
Ardrossan Shipbuilding Company.....	4	797	2,167
D. J. Dunlop & Co.....	1	605	8,670
P. McGregor & Son.....	6	435	191
J. Shearer & Sons.....	1	300	1,462
W. Chalmers & Co.....	4	257	850
W. Fife & Sons.....	4	194	290
Ferguson Brothers.....	1	190	...
D. M. Cumming.....	3	154	347
J. & J. Hay.....	2	140	105
Marshall & Co.....	1	93	...
Hanna, Donald & Wilson.....	1	70	83
R. Macallister & Son.....	3	55	64
Other firms.....	...	...	376
Totals.....	260	454,739	518,270

Scotch Combination on Steel Ship Plates.

In previous letters I have referred to negotiations which have been for some time in progress among the Scotch steel manufacturers for a combination, not to amalgamate production, but to regulate the sale on fixed bases. This combination has at length been effected, and the first result of it is that steel ship plates have been fixed at a minimum of £5 10s., less 5 per cent. Previously the nominal price was £5 7s. 6d., less 5 per cent., but some sales were made by makers at £5 net and some by dealers at £4 17s. 6d. net.

The decline is stayed, but whether English, German or even American plates can be kept away from the Clyde on the new basis remains to be seen. Steel angles were recently sold down to £4 15s., less 5 per cent., but by the combine they are now raised to £5, less 5 per cent. Boiler plates have been the subject of desperate competition for some time past, and within a year or so have been borne down from £7 10s. to about £5 10s. per ton, less 5 per cent. The combine now fixes the price at £6, less 5 per cent., which price is also named for bars and tees.

This arrangement has come as a thunderclap on dealers, who have been selling short in expectation of a con-

siderable further drop under the pressure of German and American competition. One dealer bid £5 7s. 6d., less 5 per cent., for 10,000 tons ship plates, but makers all refused to break the terms of the agreement made after so much trouble. Whether the working agreement will endure long is doubtful, in the light of former experiences on the same lines, but in the meanwhile it is serious enough. Yet it seems hopeless to try to fix minimum prices when the trade is so bad.

One large steel plant had to close up last week through sheer lack of orders, and all the others propose to prolong the New Year holidays for several weeks because of the smallness of the demand. Meanwhile it is true that, though neither American nor Canadian finished material is as yet pressing on this market, we are always receiving large quantities, and larger offers, of German and Belgian material, which is "cut" to suit the market, whatever local prices may be. Our principal steel works are chiefly given up to the production of plates, though some give most attention to angles and others to shapes. We do not make rails, and our main steel product is plates.

There is very little hope of any improvement in the demand for plates while shipbuilding and engineering are so dull as they are at present. It is true that toward the end of the year there was quite a little run of contracts for new ships, but nothing in proportion to the contracts that are being worked off. And as the year closes the shipyards close too for a long spun out extension of the season's usual holiday. Indeed, a large number of men have been already paid off, and some of the yards will start the new year with blank order books, as far as constructive work is concerned.

The application of the steel makers for a reduction of 5 per cent. in the wages of the steel workers has been before the Board of Conciliation of the Manufactured Steel Trade this week. The representatives of the men agreed to accept the reduction provided an audit of the books of the employers concerned revealed that steel ship plates have been sold during December at or under £5 10s. per ton. An independent auditor has been appointed by the board to settle the question.

Launch of a Huge Battle Ship.

A notable event on the Clyde has been the launch at the yard of John Brown & Co., Limited, of the first-class battle ship "Hindustan," one of the five battle ships which constitute a group of the largest warships in the world. They are known as the King Edward VII class, and, with the "Hindustan," include "King Edward VII," "Commonwealth," "Dominion" and "New Zealand," building at Devonport, Fairfield, Barrow and Portsmouth, respectively. The principal dimensions of each are: Length between perpendiculars, 425 feet; breadth molded, 78 feet; draft of water amidships, 26 feet 9 inches; displacement, 16,350 tons. The ram, stem, stern post, brackets, &c., are of cast steel and are castings of immense size. The weight of the ram alone is about 30 tons.

The armor is of the most effective type on the Krupp system. The depth of the broadside belt is 22 feet, having a thickness at the water line of 9 to 7 inches at the upper deck. At the after end there is an armored bulkhead between the main and middle decks, and there are armored bulkheads between the main and upper decks forming the ends of the battery. In addition to the armor protection there are two protective decks, one forming at the upper deck a crown to the battery. The other, in conjunction with the lower deck at fore and after ends, extends the whole length of the vessel, and is of a curved shape. Underneath this deck is a specially designed ammunition passage, whereby the whole vessel can be efficiently worked when the ship is engaged in action.

The armament consists of four 12-inch guns in pairs in the barbettes forward and aft, four 9.2-inch guns singly in barbettes, one on each corner of the central citadel on either side, but nearer midships than the 12-inch guns; ten 6-inch guns, fourteen 12-pounders, fourteen 3-pounders, two machine guns, four submerged broadside torpedo tubes and one after submerged tube. The freeboard of the ship is exceptionally great, the center of the 12-inch

guns being about 25 feet above the water line, and of the 9.2-inch guns 22 feet.

The machinery space is divided into six water tight compartments, two of which are used for the engines and four for the boilers. The main propelling machinery consists of two sets of exactly similar vertical, four-cylinder, triple expansion condensing engines, together capable of developing 18,000 indicated horse-power. Each set is placed in a separate engine room.

The shafting throughout was manufactured at the Sheffield works of John Brown & Co., Limited. The crank shaft for each set of engines is in two separate pieces, each piece containing two cranks. The crank shafts, thrust, tunnel and propeller shafts are all hollow, and the propeller shafts are arranged so as to allow their being withdrawn from the outside without disturbing the remainder of the shafting. The propellers are four-bladed; the blades, bosses, cones and guards are of manganese bronze, and the pins for securing the blades to the bosses are of forged manganese bronze.

Steam is supplied by a combination of 18 Babcock & Wilcox water tube boilers and three single ended return tube boilers. The Babcock and Wilcox and the cylindrical boilers were manufactured at John Brown & Co.'s Clydebank works, and are designed for working pressure of 210 pounds per square inch. The water tube boilers are arranged in the forward and two middle boiler rooms, and are designed to supply four-fifths of the total power, or about 14,400 indicated horse-power. The cylindrical boilers are capable of supplying steam for one-fifth of the power, or about 3600 indicated horse-power. The launching weight of the vessel was over 8000 tons. The keel was only completed in the middle of March last.

B. T.

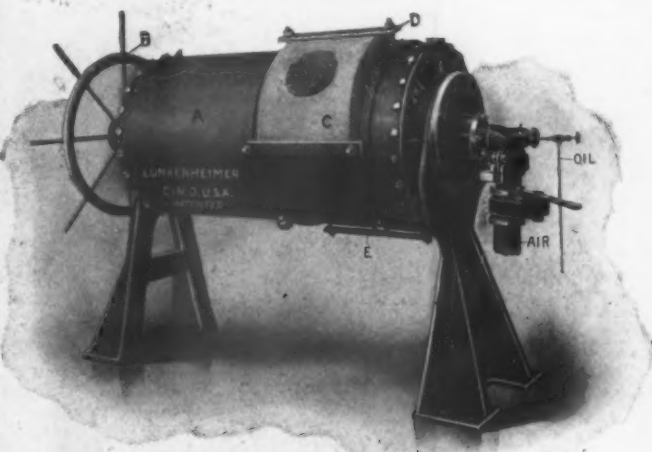
The Bateman Foundry.

The Bateman Mfg. Company, Grenloch, N. J., manufacturers of Iron Age farm and garden implements, now have their new foundry in operation. It is 60 x 120 feet, and is equipped with the latest in molding machines, power sand sieves, air hoists, trolleys and other devices that go to make a strictly up to date plant for small gray iron castings. This building is 24 feet high to the plate; immediately underneath the plate are placed 60 windows, 42 inches square, hung on trunnions and operated in sections from the floor. In addition to these windows there is 1700 square feet of glass, making the shop unusually well lighted. At night both arc and incandescent lamps furnish light. Compressed air nozzles furnish an ample supply of air at 80 pounds pressure, and are located every 12 feet around the entire foundry floor. Air is compressed by a Rand Drill Company's belted compressor. The cupola is a 54-inch Paxson-Colliau, furnished with blast by a No. 4 Greene positive blower. The charging platform is provided with storage trolley tracks served with a light transfer crane, that connects with a track on the power elevator. This system connects with the stock yard, the stock being loaded in suspended charging boxes and weighed on a track scale, then transferred to the storage tracks. The charge is later dumped directly from the box into the cupola. On either side of the charging platform are coke bins of one carload capacity. In the cupola room are located a brass furnace, a special tumbling barrel for the cupola bottom and a magnetic separator. Here also is the foundry tub, made of cement, reinforced with iron bars. The core room is provided with Millett core ovens, core machines and other up to date equipment. A locker is provided for each man, and centrally located is the tool room for the shop tools; and there is also provided a drawer, in the shape of a tool box, in which each molder keeps his tools. Power is furnished by a 30 horse-power Otto gasoline engine. In addition to the main foundry building are the fire proof pattern vault, the usual sand and storage houses, a building for tinning and galvanizing and for pickling and cleaning castings. There is a power house, containing the boiler and hot blast heating apparatus. The flask and pattern repair shop is 20 x 60 feet, and thoroughly equipped. The cleaning and truing shop is provided with

exhaust tumbling barrels, emery wheels, trolley system with track scales, and every convenience for rapidly and cheaply cleaning, weighing and truing castings. The company own sand banks not 50 feet from the foundry, from which they dig fine molding and core sand.

The Lunkenheimer Metal Melting Furnace.

Efficient and economical melting of metals, particularly brasses and bronzes, is believed to be best accomplished in a furnace designed with particular reference to the requirements of this special class of service. The type illustrated herewith is stated to have been evolved after considerable experimenting with various forms of furnaces already on the market, and is being put forth as a result of considerable study on the subject. The furnace consists of a cylindrical sheet steel drum A fitted with cast iron heads. The drum is lined inside with refractory tiles arranged to give two openings, one at each side. These holes are formed by special tiles, C, held in place by clamping bars, D and E. Only one of the openings is in use at a time; the other is closed by a filling plug of fire clay. The provision of two openings is with a view to increasing the effective life of the linings. It has been found that the lining wears out most



THE LUNKENHEIMER METAL MELTING FURNACE.

rapidly at the filling hole, which also serves as an outlet for the flame and gases during the operation of melting and as a pouring hole for the removal of the molten metal. The advantage, then, in providing two holes with each lining of the furnace is that when deterioration around one hole has reached the limit this hole may be plugged with fire clay and the opposite hole, which in the meantime has been closed, may be opened and used. The pilot hand wheel B is used for rotating the furnace in pouring out the molten metal.

Oil is used for fuel, through a burner of special type, designed to give the maximum of heat with a minimum fuel consumption. The oil is sprayed into the furnace by compressed air, the volume of the latter admitted being such as to give proper conditions for perfect combustion as well as for proper atomization of the oil. The makers state that in their own foundry are employed ten of these furnaces, from each of which six or seven heats per working day of ten hours are regularly secured. The weight of each heat is stated as averaging 550 pounds, the oil consumption varying from 2 to 2½ gallons of crude oil per 100 pounds of metal melted. The life of the lining is said to be from 300 to 400 heats, this varying, of course, with the kind of metal melted.

The whole furnace is of heavy and substantial construction, and is believed to be amply durable under all usual conditions of service. Renewal of the lining when necessary is facilitated by the simple form of the tile used. Particular attention has been given to this point, as considerable difficulty was experienced in this respect with other furnaces tested in the course of development of this type. Two sizes are made, the smaller having a capacity of 550 pounds per heat, the latter of 1200 pounds per heat. The makers are the Lunkenheimer Company, Cincinnati, Ohio.

The Brown & Sharpe No. 2-A Universal Milling Machine, Motor Driven.

An entirely new design of universal milling machine has recently been introduced by the Brown & Sharpe Mfg. Company of Providence, R. I. This machine is fitted with an independent motor and controlling mechanism, as shown in Figs. 1 and 2. An essential peculiarity of the machine proper is that the power receiving shaft runs at a constant speed and variations of spindle speed are obtained by means of change gearing. Thus the machine, when motor driven, enables the use of a constant speed motor of almost any convenient type. The motor is mounted upon a special bracket bolted di-

The mechanical details of construction, by means of which the constant speed driving shaft is made possible, and by which also the feed gearing is operated entirely independently of the spindle speeds, are of particular interest. Figs. 3, 4 and 5 show sections through the mechanism such that their construction may be understood. Fig. 3 is a vertical section through the main driving shaft to the main spindle gearing. The chain sprocket or belt wheel is attached to the outer end of the receiving shaft D, which runs through two bearings. Between these bearings is placed a small sprocket wheel by means of which the feed gearing is driven, as will be noted later. The inner end of the receiving shaft D is enlarged to form a socket at *a*, into which socket enters the shaft E

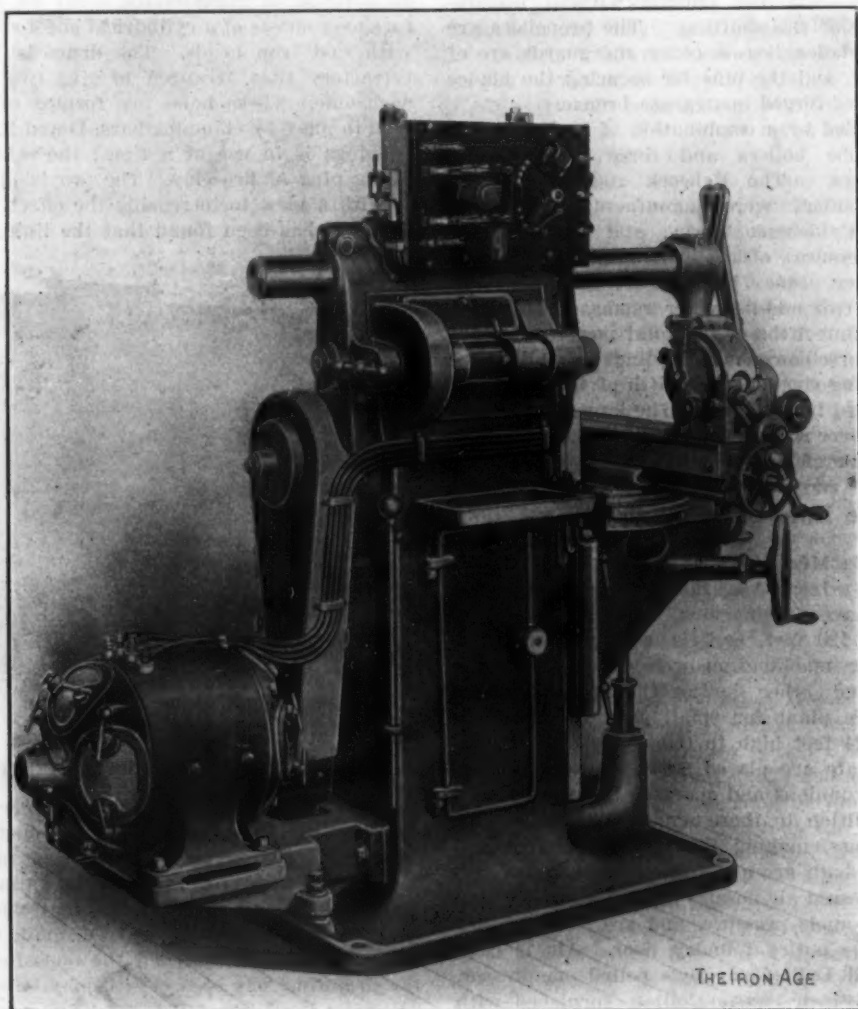


Fig. 1.—Rear Side View, Showing Motor Mounting, Connection and Control.

BROWN & SHARPE NO. 2-A MILLING MACHINE, MOTOR DRIVEN.

rectly to the base of the machine, as clearly shown in the illustrations. Connection between the armature shaft of the motor and the power receiving shaft of the machine is by means of a silent chain. Where belt driving is desirable, the toothed wheel on the receiving shaft may be replaced by a single pulley, to which power may be delivered by belt from any convenient constant speed source. Driving of the machine is thus materially simplified even for belt driving, since no cone pulleys are required. The convenient location of the starting and controlling apparatus for the motor is a noteworthy feature, especially in connection with the arrangement of the operating mechanism of the machine itself. Changes of feeds and spindle speeds require the operator to go to the rear of the machine, but with the given adjustment of these features he is afforded complete control of the milling operations without leaving his position in front. All parts of the machine are easy of access, so that all may be kept in good condition and their action observed at all times.

of the main driving gearing. The middle portion of this shaft E forms a long pinion, *b*, into which meshes an idler gear which may be slid longitudinally by the handle A, Fig. 2, so as to bring it into line with any one of the four gears *d*, *e*, *f* and *g*, carried upon shaft F. The idler gear being brought into line with any one of these gears may then be elevated into mesh with such gear by means of the handle B, Fig. 2. This handle B is attached to the tumbler *c*, Fig. 3, which carries the sliding idler gear and rotates through its necessary arc about the shell which forms the bearing for shaft E. Shaft F and its gears are, therefore, stationary in their position relative to the rest of the drive, and the driving connection between E and F is effected by means of the sliding and tumbling idler. Thus for a constant speed of the driving shaft D four speeds of shaft F are available.

The connection between shaft F and the spindle G is primarily by means of one or the other of the two gears *h* and *i*, cast integrally with a sleeve feathered upon the spindle quill H. The sleeve between gears *h* and *i*

is cut with gear teeth extending circumferentially all the way round the sleeve. Into these teeth continuously meshes pinion *j* attached to the crank handle *C*, shown in Fig. 2 at the outside of the casing. While the machine is in operation the sleeve continuously revolves in mesh with pinion *j*. With the lever *C* in the position shown, spindle quill *H* is driven by gear *h* from gear *g* on shaft *F*. This position gives the faster four speeds of the spindle quill; the slower speeds may be obtained by rotating handle *C* upward from the position shown and around until it occupies a corresponding position at the opposite side, when gear *i* will come into mesh with gear *e*. This provision of slow and fast speed connections between shaft *F* and the spindle quill doubles the speeds

shown fitted with the quill *H* carrying the gears *h* and *i*, and also the pinion *n*, corresponding to the cone pulley pinion in the ordinary engine lathe. The back gear shaft is at *K*, and is operated by the double handle *L*. This handle is plainly seen in Fig. 1, although no reference letter is there given. Inasmuch as the back gearing is incased, means for indexing its proper in and out positions are desirable, and this feature is cared for by means of the spring stop *p*. This is so placed that when the back gears are either in or out the ball on the corresponding end of the lever *L* rests in the concave face of the stop, which holds the lever in position with sufficient security without offering any great resistance to its rotation for reversing the position of the lever. The back

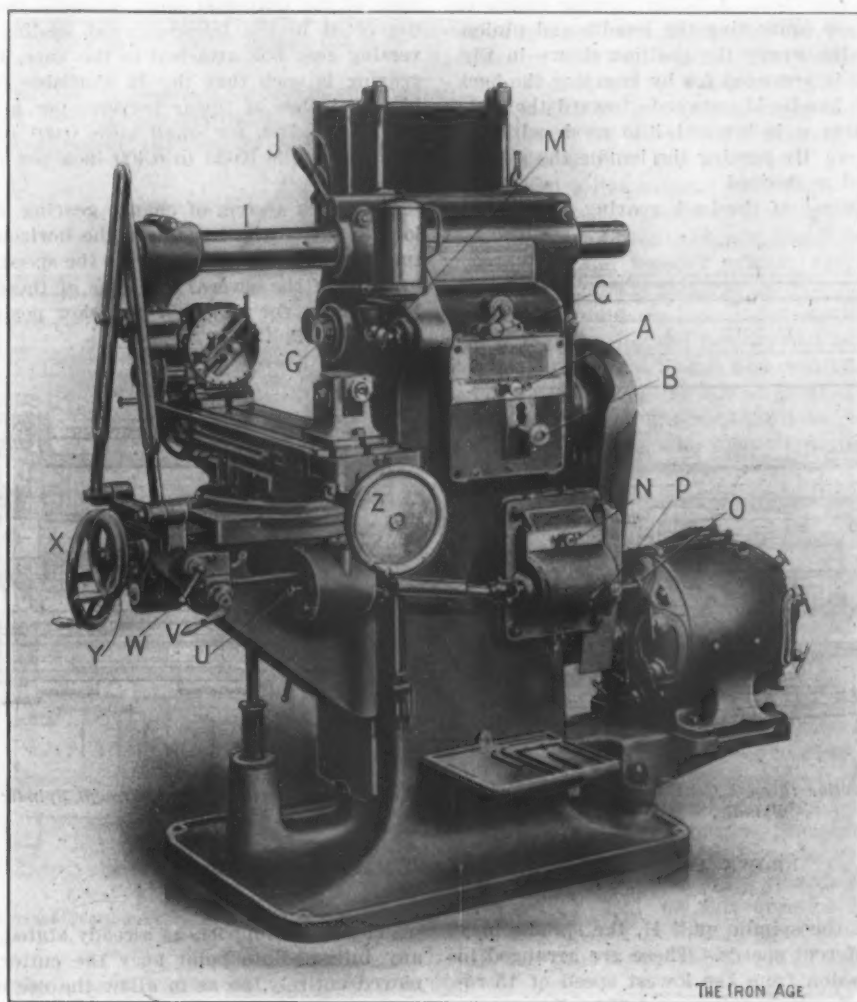


Fig. 2.—Front Side View, Showing Spindle Drive and Feed Gearing Control.

BROWN & SHARPE NO. 2-A MILLING MACHINE, MOTOR DRIVEN.

available at the shaft *F*, so that eight speeds of the spindle quill may be had.

Fig. 3 shows also the method of clamping the overhanging arm *I* for supporting the outer end of the arbor. This arm is a solid steel bar, so arranged that it may be pushed back against the head of the machine, leaving the space above the platen entirely clear. As shown in Fig. 3, the top of the frame casting is sawed apart for a certain distance inward from each end directly above the arm. This saw kerf provides the necessary clearance to allow clamping of the bar by drawing together the upper corners of the frame by means of two screws, one at each end. The front screw is provided with the lever handle *J*, Fig. 2, and both screws are fitted at mid length with the small pinions *l* and *l'*. These pinions are connected by the rack bar *k*, so that clamping is effected at both screws by the operation of the single lever *J*.

Fig. 4 is a horizontal section through the spindle and the back gears placed at the front of the machine, as clearly shown in Fig. 1. Here the spindle *G* is again

gearing is operated in the usual way, with the exception of the method of attaching or detaching the large spindle gear *m* to or from the spindle quill *H*. In this case the back gear shaft *K* is fitted with a cam collar *q*, with which engages the yoke of the bent lever *r* carried by a suitable stud attached to the frame of the machine, as shown. The opposite end of the lever *r* is in the form of a yoke engaging the groove of the collar *s*, fitted to slide longitudinally upon the hub of the large spindle gear *m*. Protruding from the inner face of this collar *s* are two spring actuated pins, *t*, passing through the web of the gear *m*, and arranged to enter corresponding steel bushed holes in the face of the flange *o* on the spindle quill *H*. The arrangement of the cam *q* and its connections to the sliding collar *s* is such that rotation of the back gear shaft *K* by means of the handle *L* to throw in the back gears first slides the collar *s* toward the right so as to withdraw the pins *t* from the flange *o*. Thus the main spindle gear *m* is released from the spindle quill, so that the spindle may be driven through the back gears. In

throwing out the back gears, the collar *s* is slid toward the left, and the spring pins *t* may enter the holes in the flange *o*, in case they are in proper relative position; if not, the pins may strike the face of the flange and then snap into place in their respective holes as soon as the spindle quill moves in starting up the machine. Operation of the back gearing is thus quite automatic under complete control of the lever *L*.

Inasmuch as the gearing is all incased, provisions for rotating the various parts by hand are necessary. For gear quill at mid length and cutting away the casing, so that the operator of the machine may readily rotate the quill by hand, to bring the gears into mesh in reversing the handle *L*. For moving the spindle by hand, the spring handle *M*, Figs. 2 and 3, in connection with the small pinion *u*, is provided. A helical spring embraces the shank of the bolt connecting the handle and pinion, so that they normally occupy the position shown in Fig. the back gears this is arranged for by knurling the back 4. By drawing the handle *M* outward—toward the right in Fig. 4—the pinion *u* is brought into mesh with the main spindle gear *m*. By turning the handle the spindle may thus be rotated as desired.

Inasmuch as the use of the back gearing doubles the

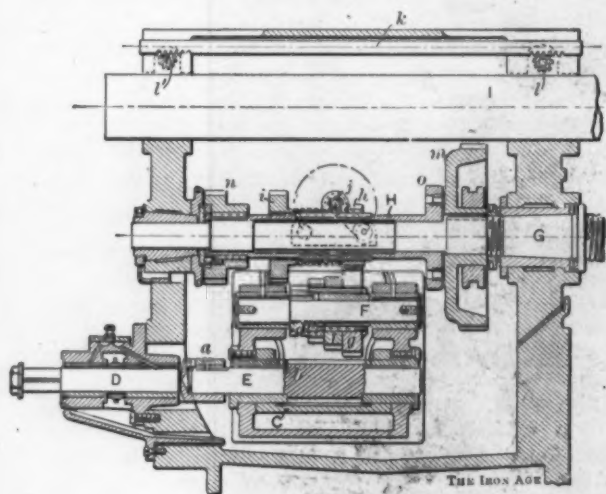


Fig. 3.—Vertical Section through Constant Speed Shaft and Spindle.

the sliding idler, not shown, which may be moved horizontally by means of the handle *N*, Fig. 2, so as to come horizontally in line with any one of the six gears *d'* to *g'*, mounted upon the shaft *R* rotating in fixed bearings. The sliding idler is brought into mesh with whatever gear it is in line with by movement of the handle *O*. This handle is clearly shown in Fig. 5, but is not so distinct in Fig. 2. Fast and slow motion of the feed shaft *S*, for each of the six speeds provided by the gears on shaft *R*, is obtained by shifting the handle *P*, Figs. 2 and 5, so as to throw either gears *g'* and *h'* or *e'* and *f'* into mesh. No back gearing is provided for the feed mechanism, and so the total number of speeds available for the feed shaft *S* is 12, the six speeds of shaft *R* being doubled by means of the sleeve carrying gears *h'* and *f'*. At *T* is the yoke of the universal joint, whereby the feed gearing is connected to the telescopic rod leading to the feed reversing gear box attached to the knee, Fig. 2. The feed gearing is such that the 12 available feeds range from $\frac{1}{2}$ to 6 inches of linear traverse per minute at the cutter. This gives for small mills 0.001 to 0.016 inch, and for large mills 0.033 to 0.400 inch per revolution of the spindle.

For each system of change gearing an index plate is located above the handle of the horizontal shifting and tumbling idler, so as to indicate the speed or feed obtained by each of the several locations of these handles, *A* and *N* in Fig. 2, for both fast and slow positions of the handles *C* and *P*.

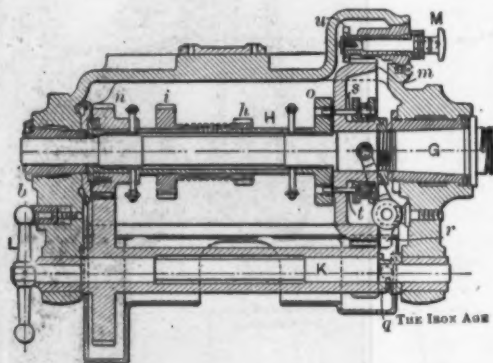


Fig. 4.—Horizontal Section through Spindle and Back Gears.

BROWN & SHARPE NO. 2-A MILLING MACHINE, MOTOR DRIVEN.

speeds available at the spindle quill *H*, the spindle may be driven at 16 different speeds. These are arranged in geometrical progression from the lowest speed of 15 rotations per minute to the maximum of 376. For a surface cutting speed of 20 feet per minute, this speed range provides for cutters from 3-16 to 5 inches in diameter; for 40 feet cutting speed, cutters as small as $\frac{3}{8}$ inch in diameter and as large as 10 inches may be used.

One essential feature of the machine, as already referred to, is that the feed gearing is absolutely independent of the spindle speeds, so that for every spindle speed there may be had any rate of feed within the whole range of the gearing provided for this purpose. This independence is readily secured in this case by the fact that the feed gearing, as well as the spindle, is driven directly and separately from the constant speed driving shaft *D*. A small sprocket wheel located between the bearings supporting the shaft *D*, Fig. 3, drives the feed gearing by means of a chain leading directly downward to the sprocket wheel *v*, fitted to the constant speed feed gearing driving shaft *Q*. The operation of the feed gearing is entirely similar to that of the spindle driving mechanism, and the functions of the various parts may readily be understood from the foregoing description of the latter. The construction differs somewhat from that of the spindle driving mechanism, as is easily seen from Fig. 5. In this illustration similar details of the gearing are indicated by the same reference letters used in connection with the spindle driving gearing in Fig. 3. Thus it is readily seen that the long pinion *b'* is engaged by

The arbor support, as already stated, may be used at any intermediate point near the cutter, or may be removed entirely, so as to allow the use of any of the attachments commonly employed. The arm braces are easily attached or removed; they are held in place by a clamp fastened to the top of the knee and by bolts passing through the arbor support. The arbor support is bronze bushed, and is also provided at one side with an adjustable center placed at the same radial distance from the overhanging arm, so that either the bearing or the center may be used, as conditions dictate.

The table may be set at any desired angle likely to be required for such work as spiral gear cutting. The range of movement in this respect is unusually large. The table feed screw is not splined, an auxiliary shaft being provided for driving the clutch gears. The life of the screw and nut is thus greatly prolonged, and accuracy of the machine correspondingly enhanced by reducing the wear of this important detail. The saddle carrying the table pivots in the clamp bed, and may be rigidly clamped to it by bolts sliding in circular slots. These slots are completely circular, so that the table may be rotated end for end, to bring either side adjacent to the face of the column. This provision is of value in enabling many kinds of work to be finished without resetting. The telescopic elevating screw under the knee does not extend below the base of the machine.

The machine illustrated in the engravings is provided with automatic vertical feed for the knee, automatic transverse feed for the saddle and automatic longitudinal

feed for the table. If the automatic vertical feed is not desired, the machines may be furnished without it. The levers for control of the automatic feeds are conveniently grouped, as shown at U, V and W, Fig. 2. The lever U, placed at one side of the reverse gear case, may be set in either of three positions. In its central position the feed gearing is entirely disconnected, while movement to one or the other of its side positions engages the mechanism for feeding in one direction or the other. V and W are levers for controlling the automatic transverse feed and the power vertical feed. The feed tripping mechanism is of the double plunger type, and is said to be unusually sensitive. The arrangement is such that throwing in the wrong clutch is impossible. The maximum longitudinal feed is 23 inches and the transverse feed 7½ inches. The table may be lowered to give a distance of 17½ inches from its face to the center line of the spindle.

A special indexing head is provided for use in cutting spiral gears. When operated automatically, in conjunction with the table movement, the velocity of the radial

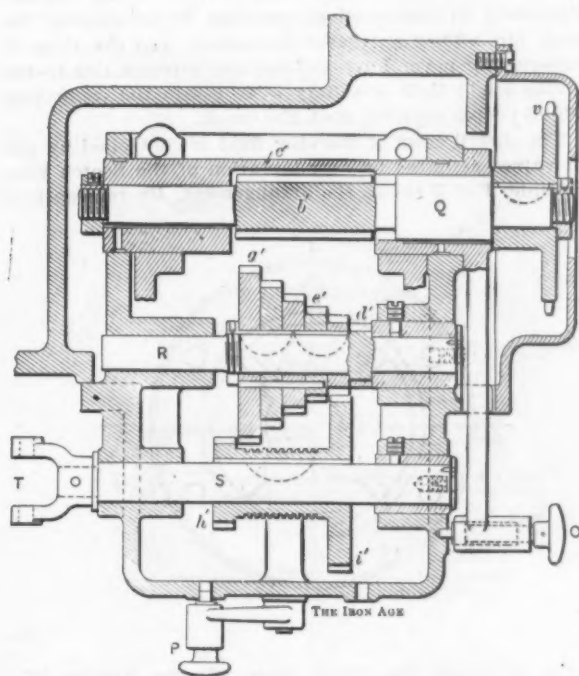


Fig. 5.—Horizontal Section through Feed Gearing.

BROWN & SHARPE NO. 2-A MILLING MACHINE, MOTOR DRIVEN.

motion of the spindle or of the work relative to that of the table feed screw in spiral gear cutting is regulated by change gears at the end of the table. The arrangement is such that spirals of almost any desired lead may be cut. The spindle of the spiral head may be revolved continuously, or may be securely locked in position after being turned through any desired part of a rotation.

Both plain and differential indexing are provided for, and any integral spacing from 1 to 382 may be obtained with the three index plates furnished with the machine. A swivel vise and other customary attachments are supplied. Work 10 inches in diameter and 19½ inches in length may be swung on the centers of the index heads and tail block.

Republic Engineering Company.—The Republic Engineering Company of Pittsburgh have applied for a charter, and will take over the business of the Diescher Coupling Company. The present works will be removed from Forty-first street and Allegheny Valley Railroad, Pittsburgh, to a new site, which has not yet been selected. The officials of the company are S. E. Diescher, president; James E. McNary, vice-president, and F. E. Russell, secretary and treasurer. The company manu-

facture complete transmission equipment, pipe couplings made under Diescher patents, tin mill machinery of their own design and patents, structural works machinery, elevating and conveying machinery, coal washeries under the Diescher patent, cork cutting machinery and special machinery.

The Philadelphia Foundrymen's Association.

The one hundred and thirty-fourth regular meeting of the Philadelphia Foundrymen's Association was held at the Manufacturers' Club, in that city, on Wednesday evening, January 6. The president, Thomas Devlin, occupied the chair and called the meeting to order at the usual hour. The minutes of the previous meeting were dispensed with as usual. The treasurer reported a balance of \$1877 on hand, with all bills paid.

The Committee on Foundry Exhibit at the St. Louis Purchase Exhibition reported progress. It was said that subscriptions for space to the amount of \$1000 had been received and that the Pittsburgh Foundrymen's Association had a like amount subscribed. It was, however, the consensus of opinion in a discussion on this matter that the Exhibition Commissioners should erect the building for the foundry exhibit, rather than put this task on the foundrymen and exhibitors, and if the commissioners would do this, there would be no difficulty whatever in getting the foundrymen and foundry supply men to contribute a liberal and creditable display, which would without doubt be one of great interest and education to those visiting the exhibition. The committee report was received, and further matters regarding the exhibit left in their charge.

The paper of the evening on the subject, "Side Blow Converters," by N. Lillenberg, was then presented and illustrated by numerous lantern slides, showing both the present day converter and those of obsolete type.

The "Quiz Class" then took up the question, "Does High Silica Facing Resist the Action of Hot Steel in Making Steel Castings to a Greater Degree Than a High Carbon Facing?" It was said that high silica facing resisted the action of hot steel, under usual conditions, the best, and that high carbon facings when carelessly applied were very apt to make blisters on the castings.

The other question before the class was, "Are Steel Castings Made by Any of the Baby Bessemer Processes, like the Bookwalter, Tropenas, Stoughton or Evans-Wills Process, Better for Certain Purposes than Steel Castings Made by the Crucible or Open Hearth Process?" No discussion was held on this question, inasmuch as Mr. Lillenberg's paper on "Side Blow Converters," previously read, had gone into this matter in considerable detail.

Seattle Steel Company.

E. M. Wilson of the Western Iron & Steel Company, Lakeview, Wash., and Seattle parties have organized the Seattle Steel Company, and have secured a 40-acre site in West Seattle, where they will erect a rolling mill. The plant will be equipped throughout with modern machinery and at first will consist of 9, 12 and 16 inch mills, to which will be added later a 22-inch mill, puddling department, machine shop, power house and several smaller buildings. It will have excellent shipping facilities both by rail and water, being connected by a spur with the tracks of the Seattle & San Francisco Railroad. Work of construction will be started within the next two months, and it is expected to have the mills in operation next summer.

The Seattle Steel Company are a distinct corporation from the Seattle Iron & Steel Company, who, as noted in these columns a few months ago, intended to erect a steel plant in Seattle. It is understood that the plans of the latter company are progressing favorably, but as many of the same persons are interested in both companies, it is not improbable that an arrangement will be made whereby the iron and steel company will either take over the new company's plant when completed or surrender their charter.

A Two-Cylinder Portable Steam or Air Motor.

Convenient power sources are not always available for driving portable tools used not alone for repair work of large and heavy machinery *in situ*, but also for original construction work in certain circumstances. H. B. Underwood & Co. of Philadelphia have naturally experienced great difficulty in this respect, owing to the fact that one of their special lines of work is that of repairing stationary, marine and locomotive engines, as well as other types of machinery which cannot be conveniently removed to a machine shop, even were there available a shop having tools of such capacity as to accommodate large pieces. The company make a business of sending machines of their own construction, accompanied by competent operators, to plants where, for instance, there is an engine

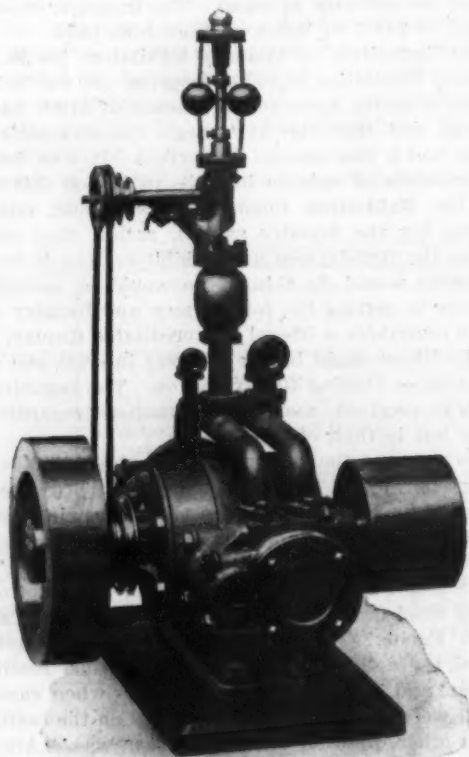


Fig. 1.—The Motor Ready for Use.

of special description. Referring to Fig. 4, it may be seen that each connecting rod has at each side of its crank pin end a segmental flange or shoulder, P. In making these connecting rods, which are of brass, the two are cast in line together, with the crank pin hole cored at the middle of the length of the straight casting. This double rod is then machined in one piece, the middle hole being bored for the crank pin hole and the complete rings or shoulders P being turned up to proper dimensions. The casting, after being otherwise finished, is cut in two along the lines shown in Fig. 4. The angularity of the crank pin ends is made such that when the crank is in either extreme upward or downward position, as shown in the engraving, suitable clearance between the abutting ends is allowed. Fitted over the shoulders of both the connecting rods at both sides are two brass rings, N, the bore of which is large enough to allow them to pass over the crank cheeks in placing them in position or in removing them. These rings, N, effectively secure the connecting rods in position against the crank pin, both laterally and longitudinally, giving proper control of their action during the operation of the engine. Each cylinder of the engine being single acting, the connecting rods are alternately in compression, exerting thrust against the crank pin. They are never in tension, and the rings N consequently never have to bear any stresses due to the driving load; their sole duty is to retain the connecting rods in proper position upon the crank.

The distribution of working fluid is controlled by piston valves actuated by an adaptation of the Scotch yoke principle. Fig. 3 shows the arrangement. By reference to

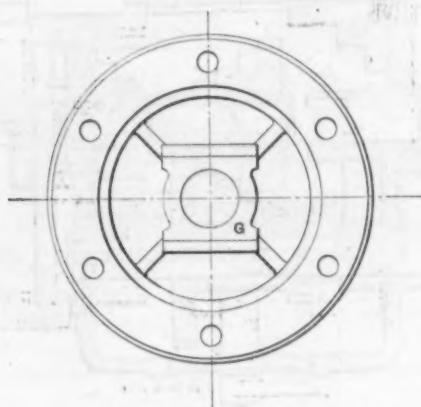


Fig. 2.—Crank Case Cover Plate, Showing Bearing for Valve Yoke.

A PORTABLE STEAM OR AIR MOTOR.

cylinder to be rebored, a valve seat to be planed, broken studs to be removed and replaced, crank pins to be fitted and trued up, or any similar work of repair or reconstruction to be attended to.

The uncertainty of available power sources for driving the machines sent out by the company, especially where the engine to be repaired is the sole prime mover, has led to the design and construction of a small and compact yet powerful and convenient motor, which may be driven by either steam or air, one or the other of which may reasonably be expected to be available at nearly every plant visited. Its diminutive size in comparison to the results which it accomplishes has led to the designation of the motor as the "Little Joker." As shown in Fig. 1 the engine is readily portable, being mounted upon a board base which may be fastened by any convenient means so as to hold the motor while in use. When desirable, the board base may be removed, and the machine bolted directly to a floor or other support.

The principle of the motor involves the use of two single acting cylinders placed in line, one on either side of the crank shaft. Into each cylinder is fitted a trunk piston, L, Fig. 4, and from the two pistons lead connecting rods, M, working upon one crank pin. The construction of the connecting rods and the method of their attachment to the single crank pin are most ingenious, and are worthy

Fig. 1 it may be seen that the chest casting, which is parted along the vertical center line, is bolted to the side of the cylinder; the outer half of this chest is shown in Fig. 3, in proper position relative to one of the piston valves F. In Fig. 1 is also seen a radially ribbed plate covering the crank case and supplying one of the crank shaft bearings. This combination cover plate bearing is shown in Fig. 3, both in section and elevation. The end view in Fig. 3 represents the valve mechanism as viewed from the inner or crank side of this cover plate. Here B is the eccentric working within the yoke block C. The yoke D is not carried by the valve stems, but is independently supported by the bearing G, Fig. 2, formed upon the cover plate casting. This bearing, G, allows the yoke D to move freely horizontally, as actuated by the yoke block C from the eccentric B. In suitable slots in the yoke D fit loosely the heads E of the valve stems, whose shanks are threaded to enter the tapped ends of the valves. The arrangement is such that the effective length of either stem may be altered to give proper adjustment of the valve. A lock nut is provided for securing this adjustment, and a separate lock nut bears against the outer side of the yoke D, giving proper control of the adjustment at this point. The valve F has no packing rings, but is provided with circumferential grooves to prevent leakage, as shown in Fig. 3.

The admission of working fluid to the valve chests is

by means of a twin pipe connection, Fig. 1, from a single pipe, to which is fitted a small fly ball governor. The exhaust is from a similar twin pipe connection, shown at the right of the admission pipe. The working fluid enters the space H of the valve chest, as shown at the left of Fig. 3. Movement of the valve F to the right, so as to uncover the port H, allows admission to the cylinder through the port I. On the return of the valve toward the left the port H is first closed and then the opening K uncovers the exhaust port J, allowing exhaust through the valve F from port I. Reference to the side view in Fig. 3 will show the oil hole at the right hand or outer side of the cover plate, and also the recess and channel by which lubricant, which might otherwise work its way out along the shaft, is returned to the interior of the crank case. The crank shaft is a solid steel forging $1\frac{1}{4}$ inches in diam-

good bearings and preventing excessive wear. The pistons are 3 inches in diameter, and the stroke is $3\frac{1}{2}$ inches. The weight of the machine complete, as shown in Fig. 1, is about 147 pounds. The floor space required by the motor erected ready to run is 19×19 inches. The height from the base to the extreme top of the governor is 30 inches.

The Indianapolis Employers' Association.—The Employers' Association of Indianapolis has been organized as a branch of the Citizens' Association of America, with the following objects: To foster the commercial interests of Indianapolis, and maintain her good name as a city free from industrial disturbance; to promote harmonious relations between employers and employees

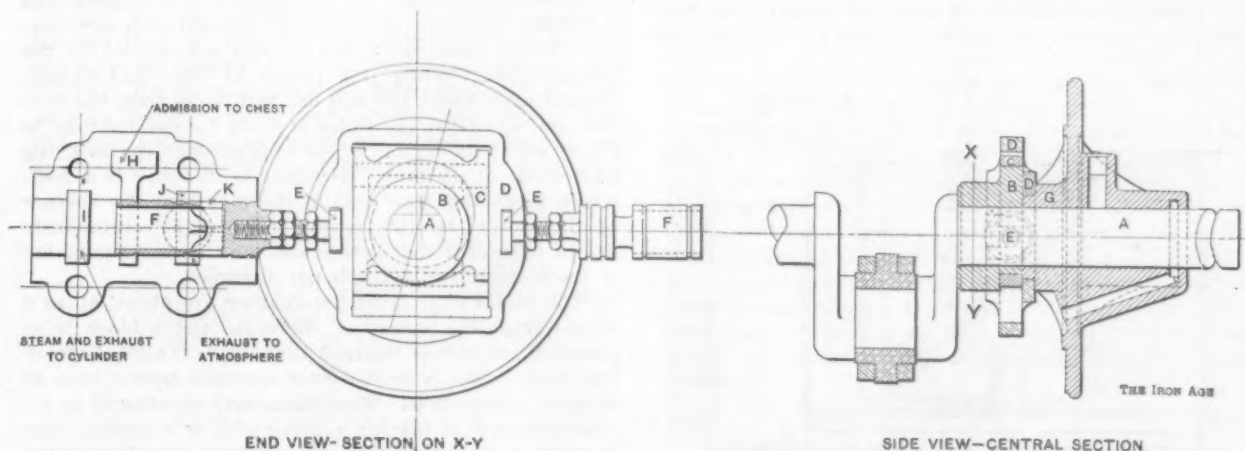


Fig. 3.—Valve Motion.—Scotch Yoke and Single End Piston Valves.

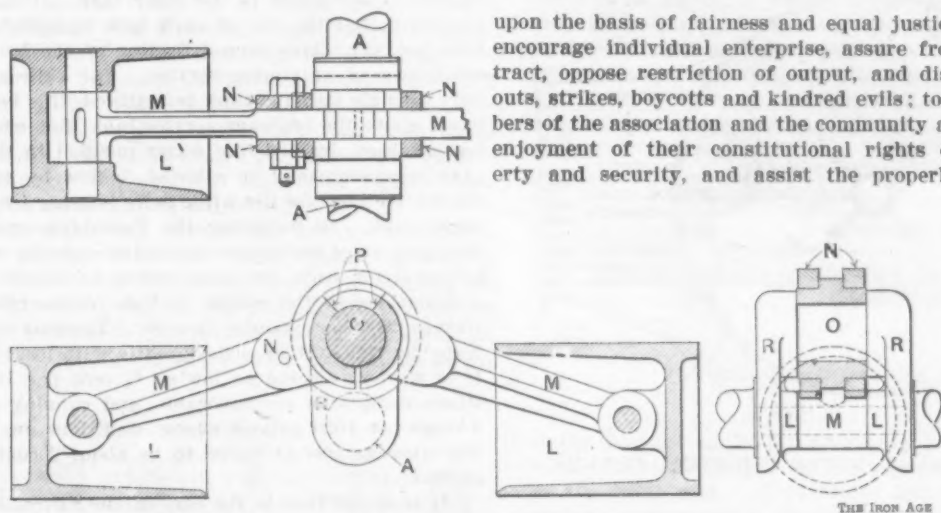


Fig. 4.—Driving Parts, Showing Attachment of Two Connecting Rods to One Crank.

A PORTABLE STEAM OR AIR MOTOR.

eter through the bearings and at the crank pin. It is stated that the balancing is so nearly perfect as to allow running of the engine at a speed as great as 400 revolutions per minute with very slight vibration.

The engine is stated by its makers to be designed on lines conducive to economy and durability, the aim being to make the "Little Joker" equal to an electric motor for general convenience, and possibly even more useful in a great many cases where steam or compressed air is available and electric current either cannot be had or must be purchased. The engine is intended for use under working pressures of from 50 to 150 pounds. The fly wheel, belt pulley and governor can be quickly detached, and the bulk of the machine thereby materially reduced for convenience in shipping and handling. The crank case is oil tight and dust proof, facility of lubrication and durability of working parts being thereby increased. The valves and pistons are both comparatively long, giving

upon the basis of fairness and equal justice to both; to encourage individual enterprise, assure freedom of contract, oppose restriction of output, and discourage lock-outs, strikes, boycotts and kindred evils; to protect members of the association and the community at large in the enjoyment of their constitutional rights of peace, liberty and security, and assist the properly constituted

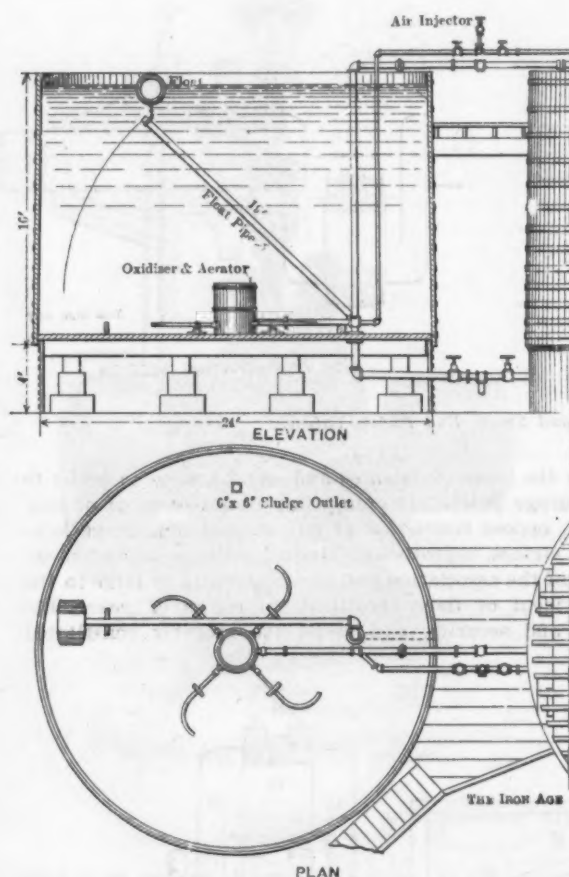
authorities in the maintenance of law and order. The officers selected were: President, John L. Ketcham, Brown-Ketcham Iron Works; first vice-president, Walter C. Marmon, Nordyke & Marmon Company; second vice-president, Chapin C. Foster, Foster Lumber Company; treasurer, Major Taylor, Excelsior Laundry. State Senator Frederick Matson was appointed temporary secretary and attorney.

At the end of October the principal large unit gas engine types were represented by the following figures for orders completed, or in course of construction: Dentz, 123 engines, 49,225 horse-power; Koerting, 70 engines, 83,475 horse-power; Nuernberg, 57 engines, 61,350 horse-power; Oechelhaeuser, 41 engines, 27,400 horse-power, and Cockerill, 116 engines, 75,600 horse-power, there being included in the list only engines rated at over 200 horse-power.

The Tweeddale Water Purifying System.

Incrustation of steam boilers is, and has been, one of the most trying difficulties connected with power plant practice. A great deal of attention has been given to removal of the trouble, the problem having been attacked from various directions. The most logical means of avoiding the difficulty is certainly that of preventing its occurrence—i. e., instead of attempting to prevent adhesion of scale forming matter to the interior surfaces of the boiler, it is much more reasonable to remove the scale forming constituents before the water is fed to the boilers. Which of these two plans, however, is the most practicable and economical in a given case must depend somewhat upon the nature of the water and the expense of application of each method.

The Tweeddale system of water purification, which has recently been introduced into this country from England, is primarily a process of aëration by means of jets



THE TWEEDDALE WATER PURIFYING SYSTEM.

of steam or air for removing organic and volatile matter, and the introduction of chemical reagents followed by coagulents. The proprietors of the system claim that it not only removes the scale forming elements from the water treated, but that it also makes the water so pure that the scale formed before the installation of the system is gradually dissolved and soon disappears.

The system generally involves the use of two wooden tanks, the water in one undergoing treatment and sedimentation while the water in the other, previously purified, is being used for boiler feeding. Very little apparatus and practically no machinery are necessary in connection with the system, and it is consequently inexpensive to install, and is operated at low cost for attendance. The engraving illustrates the arrangement of this system as actually installed in one instance. Here is shown in full one of the duplicate tanks and a fragment of the second tank, such that the arrangement of the twin pipe system is easily understood. The water to be treated enters through a supply pipe from the top of the tanks and passes to the oxidizer placed centrally in the bottom of the tank. From the oxidizer the water passes outward through the four

radial pipes with curved ends, and is allowed to flow until the tank is nearly filled. Then air under a pressure of about 45 pounds per square inch entering through the smaller pipe from above the tanks is allowed to enter the oxidizer and escape therefrom through the four radial arms, and also through the $\frac{1}{4}$ -inch hole in the top of the oxidizer. If more convenient than supplying compressed air, a $\frac{1}{8}$ -inch steam jet may be used for forcing air in through the pipe.

The air entering under pressure or forced in by the action of the steam jet violently agitates the water in the tank, the oxygen of the air removing organic and volatile matter and causing a mechanical separation of the solids in the water. After about five minutes of this agitation a predetermined quantity of a standardized chemical reagent, specially suited to the particular character of the water to be treated, is poured in, and the agitation is continued for 15 minutes. The agitation is then stopped, and a suitable coagulent is added for sedimentation purposes, after which about two hours of quiet are allowed for the precipitation. When this period of time has passed, amounting to about two and one-half hours from the time the tank was filled, the water is ready for use and may be drawn off at the bottom of the tank through the swinging pipe inside of the tank. Attached to this pipe is a float, which keeps the upper end of the pipe near the surface of the water; by this means the feed is continuously drawn from near the surface and the sludge accumulated at the bottom of the tank is not disturbed.

The radial pipes from the oxidizer are placed about 6 inches from the bottom of the tank, and a block is so placed at one side of the tank that the float pipe, descending as the water is used, cannot approach nearer than 10 inches to the bottom. The sludge may be allowed to accumulate until it reaches a depth of 5 or 6 inches; then the tank is cleaned by flushing out the sludge through the opening in the bottom provided for the purpose. While the water is being used from this tank the purification process is performed in the other tank. It is, therefore, necessary that the size of each tank be sufficient to provide for, say, three hours' feeding of the boilers under conditions of maximum service. For railroad stations only a single treating tank is required, this being so elevated above the ordinary service tank that when the latter has been drained the water purified in the treating tank meantime may be allowed to flow by gravity into the service tank for use while more is being treated in the upper tank. In installing the Tweeddale system about 1000 gallons of continuous purifying capacity are usually provided for each 100 horse-power of boilers. Present installations of the system include plants ranging from 1000 to 3000 horse-power capacity. The cost of purifying water by this system varies greatly with local conditions. It is stated as being so low as $\frac{1}{4}$ cent per 1000 gallons where conditions are favorable, and running as high as 4 cents per 1000 gallons where conditions are the worst. The average cost is stated to be about 2 cents per 1000 gallons.

It is stated that in the case of one railroad using this system, good results were evident after two or three weeks' use, and that from this time on locomotives using the treated water became rapidly freed from accumulated scale, and were thereafter practically untroubled with this difficulty. The fire boxes were stated to be in first-class condition and there was no leakage at stay bolts. Previous to the use of purified water in this case, it had been necessary to remove the boiler tubes about once in three months; the check valves had to be reground nearly every week, and the injectors were taken apart and cleaned three or four times per month. Scale would form from $\frac{1}{8}$ to $\frac{1}{2}$ inch thick in about three months' time. The estimated saving by the installation of the purifying system was about 25 per cent. in fuel consumption and about 70 per cent. in cost of repairs to parts most liable to be affected by unpurified water. Other installations of the system are stated to have resulted in similar large reductions of cost for fuel and repairs.

The system was invented by the late William Tweeddale, C.E., who, though an Englishman by birth, was General Grant's chief hydraulic engineer with the rank of colonel in the Civil War. Because of his activity in

the invention and development of water softening devices before the subject had received serious attention on the part of the engineering fraternity in general. Colonel Tweeddale is often spoken of as the father of water purifying and softening. The Helwig Mfg. Company, National German-American Bank Building, St. Paul, Minn., are by exclusive license and grant from the inventor installing this system in the States of Michigan, Wisconsin, Iowa, Minnesota and North Dakota. C. S. Burch, Fisher Building, Chicago, controls the installation of Tweeddale plants outside of the territory belonging to the Helwig Mfg. Company.

An Improvement in Open Hearth Furnaces.

The comparatively short period which an open hearth furnace can run without stopping for repairs is due to the fact that the flues between regenerators and furnace are not used equally. In consequence, the furnace does not have the same temperature throughout, and is burnt through in places, while elsewhere the lining is still practically untouched. Some years ago Schoenwalder patented an invention for avoiding this evil, which was much

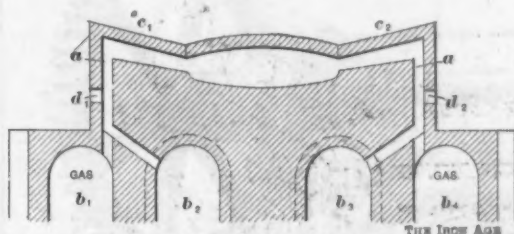
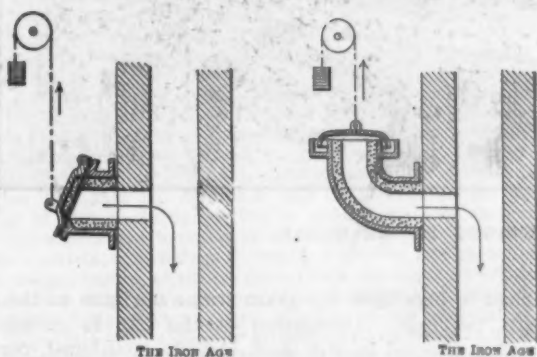


Fig. 1.—Section of O. H. Furnace.

talked about at the time, but of which little is heard at the present day. He divided the regenerative chamber vertically into two parts, each with its own flues. In these flues were dampers, by the manipulation of which the location of the hottest point could be controlled.

This invention enabled some very long runs to be made, and that the same is not more generally used is probably due to the practical difficulties arising from trouble with the increased number of valves.

Jules Puissant has introduced, at the Providence Works at Haumont (France), an invention embodying the same idea as that of Schoenwalder, but avoiding the use of internal valves. In the flues *a*, Fig. 1, leading from the checkers to the furnace, he makes openings, which may be tightly closed by some such means as are



Figs. 2 and 3.—Methods of Closing Openings.

indicated by Figs. 2 and 3. By opening one of these valves cold air is admitted and rapidly cools that part of the furnace, flues or checkers which is situated between the opening and the draft stack. This enables the operator to maintain nearly the same temperature in all parts of the furnace, whereby wear is equalized and the life much prolonged. The cooling valves should be used at the end of the furnace which is connected with the stack. By opening valves at the opposite or entering end the bath would be chilled before any cooling of the roof could take place, owing to the greater specific gravity of the

cold air. Furthermore, in the flues at the entering end gas and air are under pressure, and if an opening is made at this point the hot air will rush out. Some minutes will elapse before equilibrium is established between the air in the flues and the atmosphere, after which the draft from the stack will make itself felt. At the leaving end there is never pressure in the flues, and a valve opened here will quickly cool the corresponding regenerative chamber.

The invention has proved its value during a trial of several months at the above mentioned works. Our contemporary, *Stahl und Eisen*, reproduces a photo of one of the furnaces fitted with Puissant's patent. The expense of the installation is trifling, and if necessary the change could be made between Saturday and Monday.

The German writer, Mr. Unckenbolt of Charleroi, expresses the opinion that in the hands of a careful melter the new invention should prove of value. He suggests paying the workman a premium on the durability of the furnace, coupled with another premium for economy of fuel, to guard against too frequent use of the cooling valve, for, as he points out, there is no question but that fuel is lost each time the same is opened.

In the following number of our contemporary a correspondent points out that the practice of admitting cold air to overheated regenerators is by no means new. For this purpose, the loose brick, left in the wall or roof of the regenerative chamber for observation of the temperature, is removed. He is of the opinion that such primitive means of cooling the checkers, should only be used in case of necessity and characterizes them as "rather barbaric."

A Device for Removing Broken Taps

The removal of broken taps from partially tapped holes is an operation which, ordinarily, is by no means easy of accomplishment. We illustrate at this time a device designed to engage and remove broken pieces of taps comparatively quickly and with little difficulty as compared to ordinary methods. The device consists of a cylindrical holder, whose diameter is substantially equal



FOR REMOVING BROKEN TAPS.

to the diameter of the tapped hole, and which is provided with a squared section for the application of a wrench at the outer end. This holder has four longitudinal grooves corresponding to the flutes of the tap. These grooves in the holder are fitted with four long sliding tap engaging bars, whose outer ends are attached to a sliding collar by means of which they are movable lengthwise of the cylindrical holder. Between this collar and the working end of the grooved holder is a loose sleeve, which is to be slid along the holder close down to the work, after the tap engaging bars have been properly inserted into the flutes of the broken tap. This sleeve when thus placed close to the work, as shown in the illustration, effectively holds the tap engaging bars securely in their respective grooves in the holder at the nearest possible point to that at which the strain comes. The device thus properly placed in position, the application of a wrench to the squared end of the holder enables the operator to remove readily the broken tap by backing it out of the tapped hole.

The device is claimed to be strong, quick and sure, as well as very simple. It engages positively the broken tap, unscrewing and removing it from the tapped hole without damage to the work. Six sizes of the remover are made, for the standard sizes of taps from $\frac{1}{4}$ to $\frac{3}{4}$ inch. The manufacturers are the Atlas Machine Company, Providence, R. I.

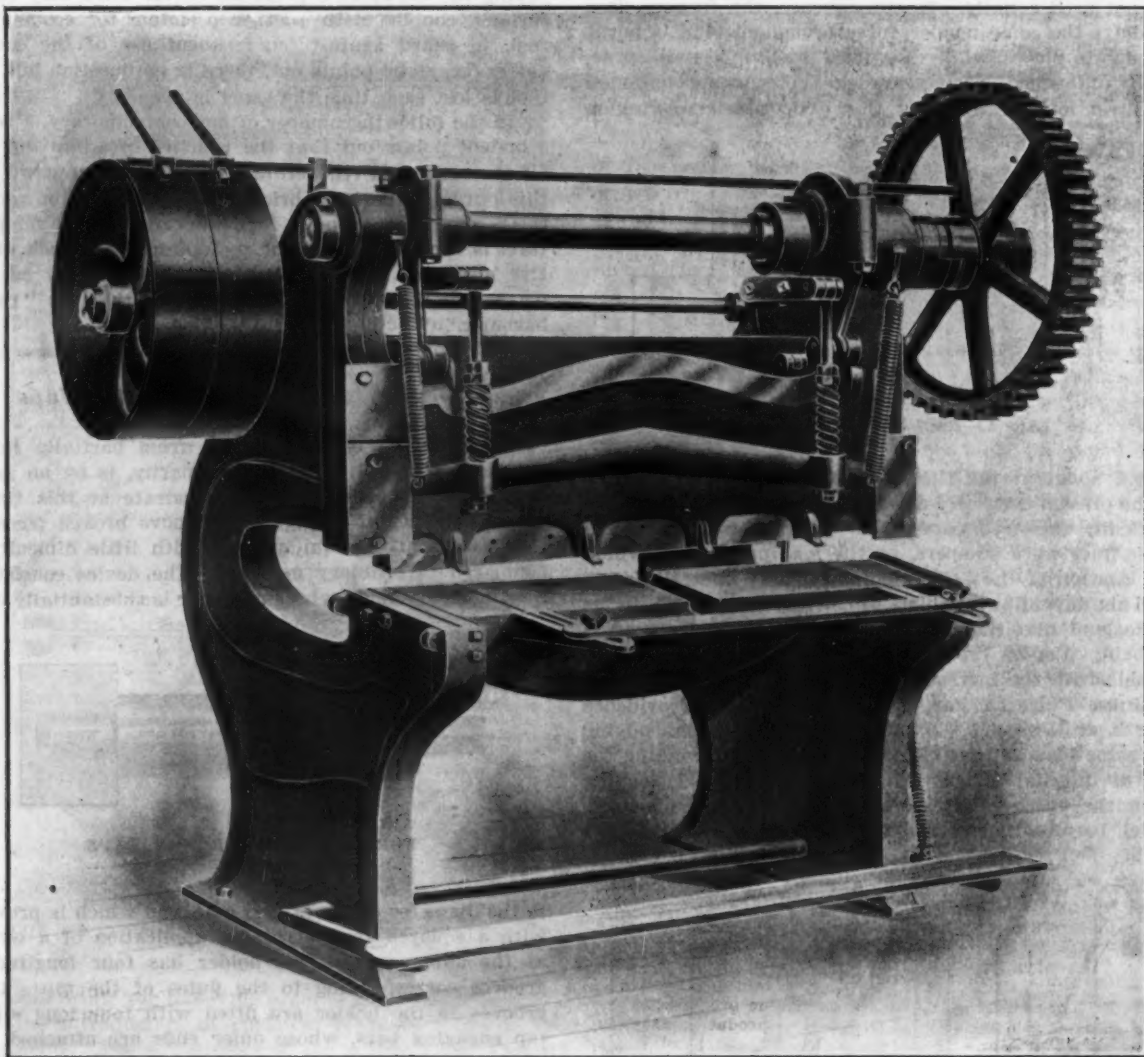
The Bertsch New Medium Weight Power Shear.

Need has been felt for a machine to meet the requirements of shops whose work does not call for a heavy shear as used in regular mill practice, yet is too heavy for the ordinary gap shear of the lighter type. The illustration shows a power shear, which is made in sizes of from 4 to 6 feet in length, and is designed for cutting material from, say, No. 12 gauge up to $\frac{1}{4}$ inch thick. The simplicity of the construction is so evident from the illustration that a detailed description would seem almost entirely unnecessary. A few features, however, are not so plainly shown and are worthy of particular notice.

Power is received by belt at the tight and loose pul-

extra heavy. The frames are massive and rigid, their proportions being such as to afford proper stiffness even with the extreme depth of throat—up to 24 inches—provided in these machines. The arrangement of all driving gearing entirely overhead avoids interference of those features with the handling of work at the height of the table.

The shear knife bar is actuated through pitmans from eccentrics upon the cam shaft, as clearly shown. Adjacent to each eccentric is a cam actuating the automatic holding down bar. The arrangement is such that this bar has ample travel to avoid interference with the plates in handling. It is cut away at its lower edge between the bearing points, so that the shearing line upon the work is hidden only at intervals. Normally the holding down bar is held in suspension above the table by two long helical springs, whose upper ends are at-



THE BERTSCH NEW MEDIUM WEIGHT POWER SHEAR.

leys fitted to a rear shaft, carrying at the opposite end a pinion meshing with the main driving gear fitted loose upon the operating shaft of the machine. The shipper for the belt is in the form of a long bar, extending the full length of the machine across the top and within convenient reach of the operator from almost any position. The dental clutch, by means of which operation of the shearing mechanism is actuated, is controlled by means of the treadle in front of the machine. The clutch is of the positive four-jaw type, each jaw faced with a tool steel plate which may be renewed when necessary. The clutch is said to be of entirely simple construction, involving the use of no triggers or springs to get out of order and cause unreliability in the action of the clutch. Bearings for both the driving and cam shafts are of generous proportions. The shafts themselves, as well as the gears and other connections, are

tached to lugs upon the main frame uprights at the cam shaft bearings. Depression of the bar to clamp the work is effected by the cams already mentioned, forcing downward the horizontal levers, against which they bear at about mid length. The rods connecting the front ends of these levers with the holding down bar proper are embraced by helical springs, whose compression is adjustable to regulate the pressure of the bar upon the work according to the requirements of a given case.

The table is provided with the makers' special adjustment devices for conveniently, accurately and safely maintaining the alignment of the shear knives. All regular front and rear brackets and gauges for use in general trimming, slitting and squaring are furnished as required. There may also be furnished with these shears a gang punch bar attachment, which may obviously be of value in some classes of work. This at-

tachment converts the machine virtually into a combined shear and gang punch. The punch bar is so arranged that it may be disengaged and locked independently in very short time, thus enabling the use of the shear as a regular shear or as a gang punch, or as both combined, as desired, with practically no loss of time for changing from one arrangement to the other.

It is claimed by the makers that the machine has no complicated parts to be deranged; that it is heavy in its construction throughout; that it is properly proportioned with reference to the duty for which it is intended; that it is built for continuous and satisfactory use for general work within its capacity. The builders are Bertsch & Co., Cambridge City, Ind.

A New Drawback Bill.

Representative Lovering Introduces a Modified Measure

WASHINGTON, D. C., January 12, 1904.—The so-called Lovering bill, designed to liberalize the drawback laws, was introduced in the House of Representatives on the 6th inst. As compared with the measure pending in the last Congress, the new bill has been modified in several important particulars, and may be said to be a much more conservative measure than the original draft. In framing the new bill the author has had the advantage of suggestions from the customs experts of the Treasury Department, and will undoubtedly have the indorsement of Secretary Shaw, who is on record as favoring a drawback system as liberal as the transferable certificate plan of the French customs laws. The text of the bill is as follows:

Be it enacted, etc., That section 30 of an act entitled "An Act to provide revenue for the Government and to encourage the industries of the United States," approved July 24, 1897, be, and the same is hereby, amended to read as follows:

"Section 30. That where imported materials or merchandise on which duties have been paid are used in the production of or joined to or form an inseparable part of articles produced in the United States, there shall be allowed on the exportation of such articles a drawback equal in amount to the duties paid on the imported materials or merchandise so used: Provided, That the drawback on any article allowed under existing law shall be continued at the rate herein provided. That the imported materials or merchandise used in the production of articles entitled to drawback of customs duties when exported shall, in all cases where drawback is claimed, be identified, the quantity of such materials or merchandise used and the amount of duties paid thereon shall be ascertained, the facts of the production of such articles in the United States and their exportation therefrom shall be determined, and the drawback due thereon shall be paid to the producer or exporter, to the agent of either, or to the person to whom such producer, exporter or agent shall in writing order such drawback paid, under such regulations as the Secretary of the Treasury shall prescribe."

Sec. 2. That when imported duty paid materials used in the production of articles produced in the United States cannot be identified by the producer as material used in the production of any particular article or articles of a lot so produced, as required by the regulations to be established under the provisions of section 1 of this act, drawback may be allowed on the exportation of such particular article or articles equal in amount to the duties paid on a quantity of like material required to produce such article or articles: Provided, That the like material used in the production of the lot from which the exported article or articles are taken shall at least equal in productive, effective and manufacturing value an equal quantity of the material required to produce such article or articles: And provided further, That where imported materials have been used under the provisions of this section, such materials must have been imported by the producer of the exported article, or must have been traced to the possession of such producer for his use, and must be charged against the record of importation, as required by the regulations to be established by the Secretary of the Treasury under section 1 of this act.

Sec. 3. That where imported materials or merchandise on which duties have been paid are used in the production of articles produced in the United States there shall be allowed on such articles when consumed on vessels clearing for foreign countries a drawback equal in amount to the duties paid on the materials or merchandise so used: Provided, That such drawback shall be determined and paid in manner provided for determination and payment of drawback on exportation of articles of domestic production made wholly or in part from imported duty paid materials under section 1 of this act.

Sec. 4. That articles of domestic and foreign production, sub-

ject to internal revenue tax or customs duties may be withdrawn from bonded warehouses free of tax or duty for use on vessels clearing for foreign countries, under such rules and regulations as the Secretary of the Treasury shall prescribe.

Sec. 5. That allowance of drawback and remission of internal revenue tax and customs duties on articles intended for consumption, as provided in sections 3 and 4 of this act, shall be limited to articles consumed on board the vessels specified in said sections after their departure from the United States.

Sec. 6. That where imported materials on which duties have been paid are used as coverings or wrappings of articles produced in the United States, there shall be allowed on the exportation of such articles a drawback equal in amount to the duties paid on the materials used as such coverings or wrappings: Provided That such drawback shall be determined and paid in manner provided for determination and payment of drawback on exportation of articles of domestic manufacture and production made wholly or in part from imported duty paid materials under section 1 of this act.

Changes in Existing Law.

The first section of the bill provides important modifications in section 30 of the Dingley act, which is the existing drawback law. It substitutes the word "produced" for "manufactured," and thereby opens up a wide field for exporters in view of the decisions of the United States Supreme Court, which have given a very narrow meaning to the term "manufactured," thereby defeating a large number of drawback claims. It has been contended by exporters that the spirit of the drawback law has been practically nullified by these rulings and there can be no doubt that many otherwise meritorious claims have been rejected by the Treasury Department for the reason that, although much labor may have been expended upon the goods in question, they were not actually "manufactured" within the meaning of the term as construed by the Supreme Court.

Section 2 of the new bill is known as the "substitution" section, but is a more conservative provision than the corresponding section of the original bill. It was the purpose of this section in the old bill to permit manufacturers to substitute at will domestic for foreign materials in any case where the producer had imported or purchased the necessary quantity of such foreign materials to make the goods. Under the original bill a manufacturer of steel rails, for example, would have been entitled to import a quantity of billets at any time and at any subsequent period upon the exportation of an equivalent quantity of rails receive back the duty paid on the billets. Secretary Shaw has stated his willingness to go as far as the original bill in the feature of substitution, but Mr. Lovering has thought it best to amend the present law in a less radical manner. Under the new bill, therefore, the substitution of domestic materials will be limited to cases in which a manufacturer, making goods simultaneously for domestic consumption and for export, shall employ proportionate quantities of domestic and imported materials, and in which it is impracticable to identify the foreign materials in the finished product.

Necessity of Substitution Provision.

Under the substitution section of the new bill any manufacturer desiring to make up a lot of products, partly for export and partly for domestic consumption, may proportion his foreign and domestic materials accordingly, and receive back the duty paid on the imported materials, even though there may be a quantity of domestic material in the exported articles. There is, of course, no opportunity for fraud upon the Government in such a transaction nor can any protected domestic interest suffer thereby. In the execution of such a provision the manufacturer can be required to make affidavit with regard to the relative quantities of imported and domestic material used and the destination of the finished products, whereas under the existing laws, as found in section 30 of the Dingley act, a manufacturer who has employed both foreign and domestic materials is precluded from swearing that the exported product is made exclusively of imported materials.

The Ways and Means Committee will probably give a hearing on the drawback bill within the next fortnight at which it is expected a number of prominent representatives of the iron and steel trade will be heard, together with those of many other leading industries.

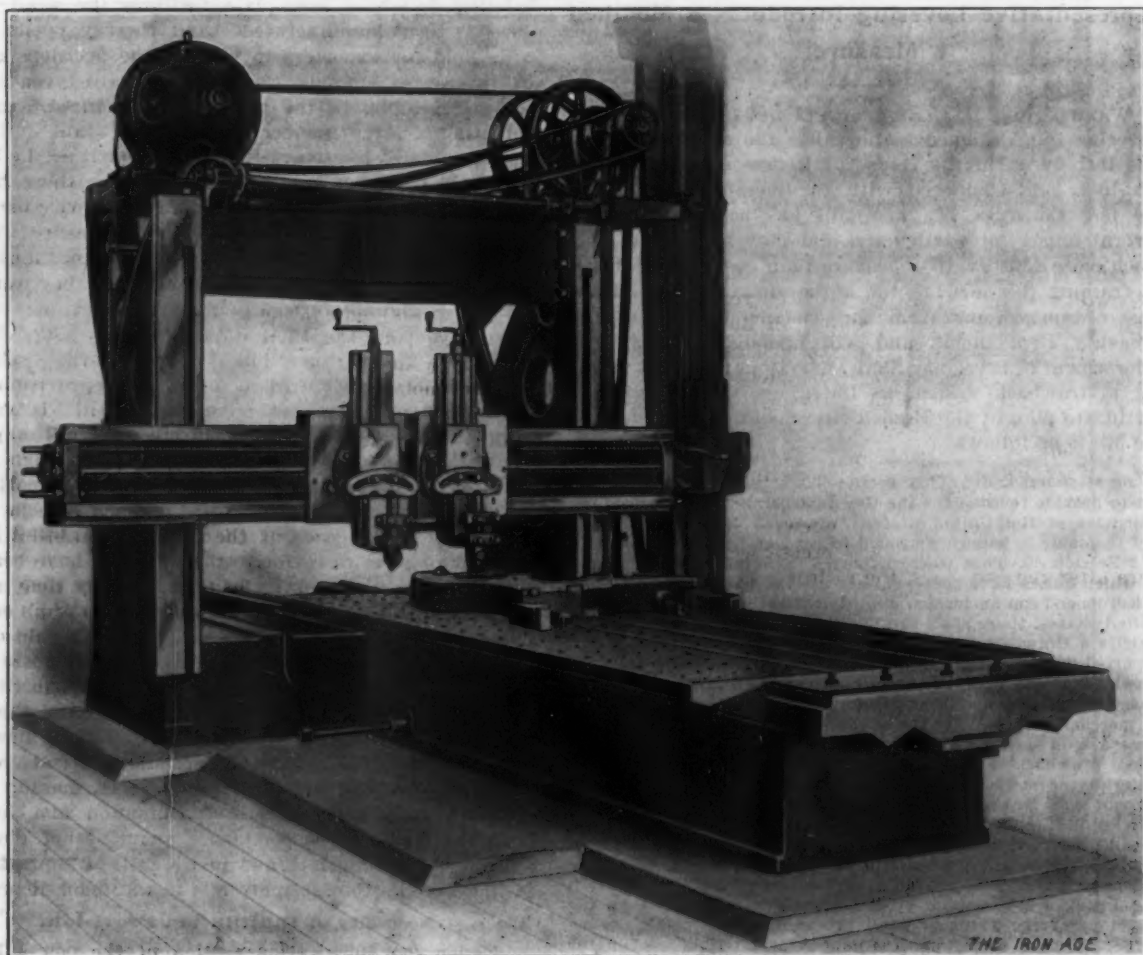
W. L. C.

A Gray Widened Planer, Motor Driven.

In shops where the general run of work is of great width in proportion to its height, yet is not so excessively heavy as to warrant the use of a planer of the larger standard size, a machine of the "widened" type may be installed with considerable economic advantage and without the least mechanical disadvantage. The illustration shows a planer of this type, in which the general construction and the proportions of the parts are the same as in the standard 60 x 60 inch machine, built by the same makers. The rear upright, however, is set upon an extension to the main bed and at a considerable distance from the usual position. The connecting piece at the top between the uprights and also the cross rail are lengthened to suit. The widening is thus effected entirely at one side, the gain in this case being 24 inches, so

arrangements. The duplex shifter embodies the provision of shifting levers and dogs at each side of the machine, such that the operator is afforded perfect control from either side, and need not lean over the table or walk around the machine in order to start or stop it. The universal feed mechanism is so arranged that not only may the feed be made to take place at either end of the stroke, but all feeds may also be started and stopped simultaneously, and change may be made from coarse to fine feed, or *vice versa*, all without stopping the planer. The cross rail is necessarily of extra length, on account of the widening of the machine, but is also extended beyond both uprights, so that either of the two heads may be so placed as to enable it to cut to the full width of the opening between the uprights.

The planer is one of the most difficult tools to operate satisfactorily by a motor drive. Various methods of at-



GRAY 84 x 60 INCH WIDENED PLANER, DRIVEN BY CROCKER-WHEELER MOTOR.

that the total horizontal distance between the uprights is 84 inches instead of 60 inches. The table, or platen, is provided with an overhanging extension in the direction of the offset upright, adding considerably to its breadth. The advantage of this method of widening the planer entirely at one side is that there is no disturbance of the ordinarily handy relation of the parts at the front side, so that the facility of control of the machine by the operator is not impaired.

The table of the machine illustrated is 12 feet long and is moved by a spiral geared driving system of the familiar Sellers' type, consisting of a spiral pinion engaging directly with the rack attached to the under side of the table. This pinion is mounted upon a shaft, which crosses the bed diagonally, and which is driven by a pair of bevel gears from the pulley shaft. The V-ways of the bed and table are automatically oiled by double cone brass rollers, supported by springs in pockets containing baths of oil, as in the usual practice.

Among other peculiar characteristics of the machine are its duplex shifter mechanism and the universal feed

mechanisms. The duplex shifter embodies the provision of shifting levers and dogs at each side of the machine, such that the operator is afforded perfect control from either side, and need not lean over the table or walk around the machine in order to start or stop it. The universal feed mechanism is so arranged that not only may the feed be made to take place at either end of the stroke, but all feeds may also be started and stopped simultaneously, and change may be made from coarse to fine feed, or *vice versa*, all without stopping the planer. The cross rail is necessarily of extra length, on account of the widening of the machine, but is also extended beyond both uprights, so that either of the two heads may be so placed as to enable it to cut to the full width of the opening between the uprights.

Various methods of attaching motors to tools of this type have been attempted with varying degrees of success, according as the requirements of the work were recognized and fulfilled. In a machine of the planer type the elasticity of the belt drive is of essential value in the operation of the tool, and it has thus far been found that motor driving is most successful where belt connections between the motor and the planer are retained—i. e., the most satisfactory adaptation of the motor is that in which it really simply replaces the countershaft and is not directly attached to the driving gear of the machine. In the case of the planer under consideration, one means of thus replacing the countershaft by the motor, while still retaining the desirable belt connection, has been employed. Here the motor is mounted upon a special bracket above the rear upright and drives a countershaft, mounted in a similar location, above the front upright. From this countershaft lead the open and crossed belts for the two directions of the table travel and for the raising and lowering of the cross rails. The table driving belts pass vertically downward along the front upright to the side of the bed

and there wrap around the table driving pulleys. The cross rail elevating and lowering belts lead horizontally back from the countershaft to the proper pulleys near the motor at the rear upright. All pulleys which run continuously in one direction—especially that mounted upon the motor armature shaft—are made with heavy rims, so as to give a fly wheel effect and by their momentum assist in reversing the table at the end of the stroke, thus reducing the sparking of the motor.

The motor itself in this case is a 20 horse-power semi-enclosed constant speed machine, built by the Crocker-Wheeler Company, at Ampere, N. J. Current is supplied on a three-wire system at 115 volts on each leg, thus making available two fundamental speeds of the motor corresponding to 115 and 230 volts. The speed corresponding to 230 volts is in this case about 775 rotations per minute. The planer was recently built by the G. A. Gray Company, Cincinnati, Ohio, and is now in operation at the works of the Marine Engine & Machine Company, at Harrison, N. J.

British Railroad Engineering.

LONDON, January 2, 1904.—Now that the markets are quiescent on account of the holidays, we can with advantage turn to a department of engineering which affects vitally the iron and steel industries—viz., railroad engineering—and note the developments which are actually taking place or are impending. The year just closing has not been a successful one for the chief British and Irish railroads. With the close of the year the returns of the 17 principal English and Irish lines show a decrease of not far short of £400,000, or 0.08 per cent. On the Scottish lines the decrease amounts to 1.7 per cent. Some companies show slight increases, but most decrease. It would therefore seem an unfortunate, if not an impossible time, for great railway changes. None the less, engineering necessities develop without much regard to the financial situation, and those responsible for railroad policy have to take a long view. Thus, even if we are moving into a period of depression, the usual lean years after the fat years, the railroad managers have to make ready for all the demands made upon them when the good years return.

The feeling of financial insecurity among railroad shareholders at the present moment is ascribed to three different causes: 1, The perpetual increase in the percentage of working expenses to receipts; 2, the constant addition to the capital expenditure of railroad companies; 3, the loss of traffic, both existing and prospective, due to the competition of other forms of transport. The average ratio of working expenses to receipts of English railroads in the year 1881 was 52 per cent.; in 1901 it stood at 63 per cent. This marked increase is due to the increase in local rating, the increase in wages, the increase in the cost of materials and the increasing number of complex appliances requiring skilled labor now to be found in the modern train. The constant increase in the capital expenditure has so exceeded the increased earnings that the average dividend percentage since 1890 has fallen from 4.1 to 3.27.

Railroad Electrification.

It is in the large centers of population, particularly in London and Manchester, that the question of suburban traffic has become of first importance to the railroad companies. Oddly enough, although the danger signal is in London, yet it is in London alone where the receipts of the railroad companies have gone up, while in the provinces the railroad suburban traffic has decreased. This is doubtless owing to the backwardness of the metropolis in electric traction. But this is fast being rectified by the electrification of the underground railroad and by the rapid extension of electric tramways under the ownership of the London County Council. An engineering expert, speaking on this subject, says:

"The real solution of the problem is to be found in a more rapid acceleration of the trains. American experience has clearly shown that the only practical way of handling suburban traffic is the adoption of electricity."

The conclusion reached by other engineers is that only by some method of electrification can the economic and mechanical difficulties now confronting railroads be surmounted. What, however, is to be the actual electrical system of the near future it is not so easy to forecast. The expert from whom I have already quoted thinks that the most satisfactory and popular system at the present time is the multiple unit system, in which each car or each alternate car, as the case may be, contains its own electric motors. It must be observed, too, that if it be possible some system must be adopted which can be extended to long distances as the years go by. At the present moment the methods used for comparatively short distances are entirely inapplicable when we come to consider the hundreds of miles of line.

Present and Immediate Electrification Contracts.

As showing that the foregoing is not mere theory, it is announced that an important contract for the equipment of the large three-phase electricity generating station about to be erected by the Great Western Railway Company at Park Royal, near London, has been secured by the Electric Construction Company of London and Wolverhampton. The station will require about 10,000 horse-power of plant, available for either lighting or traction.

Only a few days ago the North Eastern Railway Company carried out extended trials of the newly electrified branch of their line between Newcastle and Monk Seaton Station, on the other side of Tynemouth. The distance is about 10 miles, with a double track, making the length of rails traversed rather over 20 miles. It is stated that the trials were thoroughly satisfactory.

The London & South Western Railway Company are now completing at their Nine Elms locomotive works a powerful motor car, which will shortly be experimented with in order to see whether the road motor car can be profitably utilized in affording increased transit facilities in districts served by the company.

The Cost of the Siberian Railroad.

At the present moment the Siberian Railroad is of unusual interest, and it may, therefore, be useful to observe the contents of an official publication just issued to commemorate the tenth anniversary of the Imperial Committee of the Siberian Railroad, the president of which is the Czar. The total cost of the line through Siberia and Manchuria to Vladivostok and Port Arthur is given as 940,000,000 roubles (\$497,500,000), which works out at 103.987 roubles per verst for the 9042 versts of the whole undertaking (5992 miles, averaging \$83,000 per mile). There are only two engineering difficulties of any magnitude in the whole line—namely, the Circum-Baikal line, where the hilly, rocky country will require much blasting, and the formidable tunnel through the Khingan range of mountains. But neither of these difficulties has yet been overcome, so that the expenditure dealt with in the above figures is for a plain piece of rail laying over easy levels and largely over perfectly flat surfaces.

When it is remembered that the land over which the line runs cost nothing, being given by the Government, and that the timber was obtained on the same terms, while a very considerable part of the undertaking was facilitated by the free use of convict labor, the stupendous items of the total become absolutely inconceivable to the non-Russian mind. M. Witte, after his memorable trip to the Far East, reported that there had been no amount of corruption to call for particular remark. If his report came anywhere near the truth, we can only suppose that the colossal figures of the expenditure on this bold stroke of an aggressive foreign policy, which has swallowed up the proceeds of more than one foreign loan "for railroad construction," are to be really explained as having gone to the provision and maintenance of the army of Manchuria. The sum actually set down as expended on the "protection, &c., of the Manchurian line" is not more than \$23,750,000, which is altogether too modest a figure for what Russia has accomplished in the military department in Manchuria since the Chinese troubles ended there.

S. G. H.

Mexican Railway and Industrial Notes.

Monetary Reform.

DURANGO, January 5, 1904.—The Mexican Monetary Commission have completed their labors. The long series of academical essays upon the evils of the free coinage of silver has been reinforced by what may be termed the verdict of the jury in the case as submitted for their consideration a year ago by Señor Limantour. The commission's findings are embodied in a final report made by the fifth subcommittee. This report is long and involved and comprises 13 articles. The first of these is the shortest and most important, the others being supplementary. They go into much detail as to ways and means. The first article reads:

In order to obtain stability or fixity of international exchange, the Government should be advised to adopt a monetary system based on the gold standard.

Even a synopsis of the plan advocated to bring about the change would require more space than *The Iron Age* would care to devote to the subject, but it may be said in brief that the commission recommend the closing of the mints to the free coinage of silver; the prohibition of the reimportation of silver dollars; the coinage of a new silver dollar, "which will weigh 27.1550 grams and will contain 24.4395 grams of pure silver," and of subsidiary coins of designated weight and fineness, and the creation of a gold reserve out of the surpluses of Federal budget appropriations and from other sources.

Railway Concessions and Construction.

Chicago capitalists, among whom are Edgar B. Tolman, A. P. Ballan and A. G. Beaunisne, have obtained a concession for the construction of a line of railway from Yabaros, on the Gulf of California, to the city of Alamos, 80 miles distant. The road will run through the rich agricultural valley traversed by the Mayo River, and will be known as the Southern Sonora & Alamos Railway. Surveys have already been completed for a portion of the projected line, which is expected to prove a very profitable enterprise, the district through which it will pass being exceedingly productive in minerals. The company's concession is a liberal one, embracing a term of 99 years. It permits the free importation of equipment and construction material, grants exemption from taxation and authorizes the company to impose exceptionally high tariff rates.

The preliminary steps toward the merging of the three railway systems in which the Government is interested have been taken in the form of an agreement between the boards of management of the Interoceanic Railway Company and the National Railway Company of Mexico, whereby the latter assume the operation and maintenance of the former system "on behalf and for account of the Interoceanic Company." The agreement made is for one year from January 1, 1904, "and thereafter, until six months' notice in writing is given by either party" to terminate the agreement. Following this compact, the National Railway Company issued instructions to the officials of the Interoceanic that hereafter all accounts and reports relating to that road are to be sent to the New York offices of the National Railway Company, instead of to the Interoceanic's London offices, as heretofore. It is believed that a similar agreement will soon be made under which the International Railway will cease to be operated independently, and that the management of the combined systems will be placed in the hands of Walter Morcom, the present general manager of the Mexican Southern Railway.

Good progress is being made upon the construction of the Morelia & Tacambaro Railway, under the Peyton concession, previously reported. A large number of workmen are employed, and the force is to be further increased, with the hope of completing the first 80 km. from the initial point at Irapuato by next fall.

The San Gregorio Railway, about 33 km. in length, owned by Señor Eusebio Rojas of Guanajuato, is to be extended to connect with the National Railway at Gonzalez. The new construction will be 11 miles in extent.

The railway connects the town of Marfil, Guanajuato, with the San Gregorio mining district.

Señor Francisco M. Aguilar has been granted a concession by the Durango State Legislature for the construction of a line of railway from Hermesillo to the Villa de Seris, in this State.

The Cieneguita Mining Company of the State of Sonora purpose constructing a railway 100 miles in length from their mines to Minas Prietas, and have made a preliminary survey of the route.

Modifications of the original concession granted to the Southeastern Railway of Yucatan require that the company complete 50 km. of road within a year from November 23, 1903, and at least 100 km. in each successive two years thereafter, and that all the lines within the original concession shall be completed within 12 years from the date named. The Southeastern Railway is a part of the United Railways system of Yucatan.

A Mexican company intend to construct a railway between the cities of San Andreas Tuxtla and Santiago Tuxtla, in the famous tobacco region of Vera Cruz, and on to the port of Somtecompar, on the Gulf of Mexico. The construction will be some 40 km. in length.

Industrial Notes.

The following information will no doubt be useful to commercial houses unfamiliar with Mexican laws relating to drummers and their samples: "Traveling agents in the City of Mexico and the surrounding Federal district are free from all taxation. In all other parts of the republic a tax is imposed, which varies according to the number, variety and value of the commodities or samples handled by the agent. After the payment of this tax the agent is legally free to conduct business with merchants as well as with private individuals. Samples possessing a value are subject to the regular duty when crossing the frontier or entering through a maritime port, but when a declaration is made by the agent at the time of importing them to the effect that it is his intention to re-export them within a certain period the duty is refunded, if such re-exportation is made within the declared period."

The Monterey Iron & Steel Company have started up their steel merchant mill, and are now prepared to turn out merchant steel of various sizes and shapes.

It is reported that California capitalists will reorganize the Mexican National Oil & Development Company, who went out of business some time ago, and that operations in the line of oil prospecting upon the large tract of land on which they hold leases, near Matamoros, Tamaulipas, will be resumed.

The International Railway Company have received five new locomotives of the consolidated type from the Baldwin Locomotive Works.

Among orders for machinery and equipments recently placed in the United States for shipment to Mexico were the following: Twenty cars for the National Tehuantepec Railway Company, with the Pressed Steel Car Company of Pittsburgh; for machine tools, with the Niles-Bement-Pond Company of New York, through that company's local representative; an order for locomotives with the H. K. Porter Company of Pittsburgh. The Philadelphia Pneumatic Tool Company have also booked an order for their specialties, and the John A. Roebling's Sons Company, of Trenton, N. J., and Robert Wetherill & Co. of Chester, Pa., respectively, have been given orders for wire and driving engines for sugar mills.

The Treasury Department has fixed the rate for the liquidation of import duties for the current month at 225.75 per cent.

J. B. Foss of the J. B. Foss Coal Company of Virginia is the owner of a large tract of coal bearing lands in the State of Puebla, which he intends to develop without delay. The coal is bituminous, and is reported as being easily worked and of great quantity. The lands are not far from the line of the Vera Cruz & Pacific Railway. A company is to be formed to work the mines, and a railway will be constructed to the coal fields if the developments are favorable.

An electric lighting system is to be established in the town of San Martin Texmelucan, Puebla, as well as in towns in the State of Michoacan. Señor José María

Barragan of Jiquilpan is interested in the last named enterprises.

The drainage works in the city of Mazatlan, Sinaloa, are to be carried out by C. C. Chandler, and not by William Astor Chandler, as at first announced.

Irrigation concessions have been obtained by Señor Regino Sanchez and the Colorado River Colonization Company, A. J. Flores, president, for utilizing respectively the waters of the Sinaloa and Colorado rivers for the purpose indicated, the conditions of the grants being of the usual character.

A company with a paid up capital of \$200,000 will establish a starch factory in the city of Tepic, and will be in the market for the necessary equipment.

Sugar milling machinery will be needed by A. B. Allen, the owner of a plantation situated near Cordoba, Vera Cruz, who is about to establish a plant upon his property.

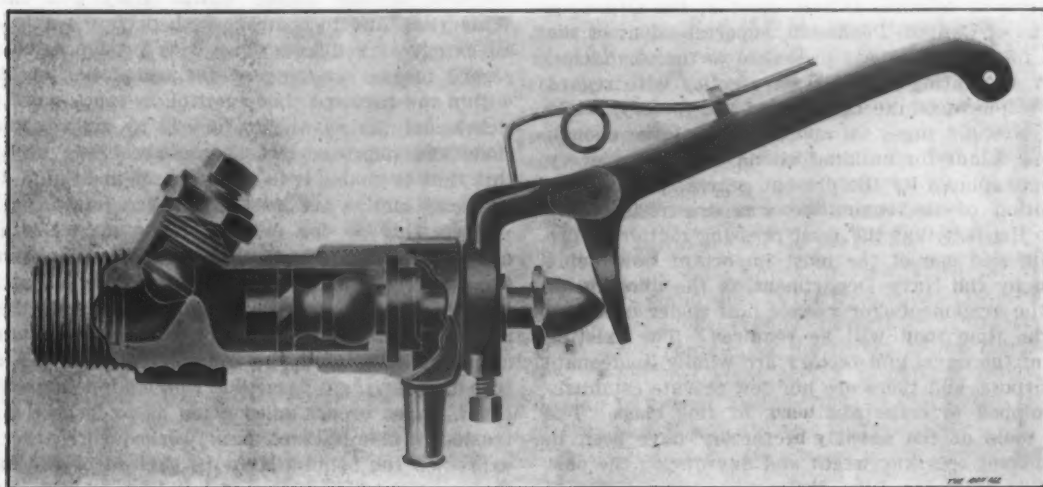
The Compañia Manufactura de Clavos, S. A., have been organized in St. Luis Potosi, with Enrique Deutz as manager, and have established in that city a factory for the manufacture of wire nails.

The Monterey Gas & Electric Light Company intend

The Cadman Indestructible Gauge Cock.

Indestructibility as a feature of the Cadman gauge cock is dependent upon the provision of a positive outside shut-off which the engineer may close at any time that the action of the cock should become impaired. As shown in the illustration, this independent shut-off is placed between the gauge cock plunger and the boiler, and is in the form of a screw attached to a tapered valve placed at an angle of about 30 degrees from the vertical. By applying a wrench to the squared head of the screw outside of the stuffing box shown the valve may be closed and the gauge cock proper thus relieved of the boiler pressure. The whole working mechanism may then be removed for repairs or renewal of parts, as may be necessary.

Of the gauge cock proper both the valve and its seat are reversible, so that in making repairs either or both may be removed and replaced in the inverse position. This provision practically doubles the life of the gauge cock at vital points. The valve is a ball of bell metal,



THE CADMAN INDESTRUCTIBLE GAUGE COCK.

to enlarge their present plant and have made a contract with J. G. White & Co. of New York for the additional equipment.

J. J. D.

The Clairton Steel Company Receivership.—At Pittsburgh last week an order was handed down in the United States Circuit Court in the matter of the Clairton Steel Company. A petition was presented to the Court by the receivers of the Clairton Steel Company asking that they be allowed to pay the employees the wages that were due them. The order was immediately made by the Court granting the permission asked for. The amount due the employees is \$26,733.25. In the United States Circuit Court the Mesta Machine Company and the American Ingot Mold Company, both of Pittsburgh, have filed petitions, asking permission to file mechanics' liens against the property of the Clairton Steel Company. In each case the Court made an order granting the permission. An order was made in the United States Circuit Court on a petition made by the Union Trust Company and William G. Park, receivers for the Clairton Steel Company. The order was made to allow the officers of the Clairton Steel Company to carry out, on behalf of their company, an agreement made with the Union Trust Company, People's National Bank, Pittsburgh Trust Company and the Farmers' Deposit National Bank. These four banks hold notes of the Clairton Steel Company, and time is allowed by the order for payment on notes held, so that the plans of the original decree will not conflict with those of the receivers.

The National Builders' Supply Association will hold a three days' annual convention in Buffalo, N. Y., commencing February 1, with headquarters at the Hotel Iroquois.

and the seat is of hard phosphor bronze. After being used in both positions, they may be replaced by a new valve and seat, and may then be reground into perfect condition for reuse when a second renewal is necessary. Regrinding may be continued until both are completely worn out. With duplicate sets, then, of valves and seats, which are the only parts of the valve subject to serious wear, the gauge cock is believed to be fully worthy its designation as being practically indestructible. It is stated that the valve and seat are quite inexpensive, so that their replacement when necessary is a very small item.

The valve stem is provided with a flutter wheel, which causes it to revolve while the gauge cock is open and the steam is blowing past it. Thus the valve will seldom, if ever, return to its seat in the same position as before. The flutter wheel also acts as a guide to keep the valve stem central after leaving its seat, and until it is again properly closed.

The shut-off feature of this valve is urged as a very important point in its favor, especially on boilers in plants where continuous operation is necessary or desirable. It is made by the Cadman Mfg. Company at Pittsburgh, Pa.

A test will soon be made by navy and ordnance experts of the first piece of armor plate turned out by the Midvale Steel Company, Philadelphia, under their contract with the Government, awarded about two months ago, to furnish 6000 tons for two ships of war. It is said that the plate made last week was turned out at a small forge used for experimental purposes. The erection of the new armor plate plant is advancing rapidly, but will require over a year for its completion.

The Naval Gun Factory.

Plans for Its Enlargement Submitted to Congress.

WASHINGTON, D. C., January 12, 1904.—The House Committee on Naval Affairs, which is now engaged in formulating the annual naval appropriation bill, is giving very serious attention to the recommendations of the Navy Department with regard to an important increase in the facilities of the naval gun factory and the general policy to be pursued by the Department with regard to manufacturing naval ordnance, which involves the question as to whether the Government shall build all the guns required or shall let a portion to private contractors. The views of the officials do not altogether coincide, and the Secretary of the Navy has deferred making specific recommendations until advised as to the limit which the House committee is disposed to put upon the sum to be appropriated for the gun factory. When this point has been settled he will submit detailed estimates.

The views of Admiral O'Neil, chief of the Ordnance Bureau, and of Captain Pendleton, superintendent of the naval gun factory, have been presented to the committee, the former advocating a conservative policy with regard to the development of the facilities of the factory, while the latter strongly urges an appropriation large enough to provide a plant for building all naval guns of every caliber contemplated by the present general programme. The attention of the committee was drawn by these officials to the fact that the most pressing matter before the bureau, and one of the most important now being considered by the Navy Department, is the question of building the armaments for vessels now under construction by the time they will be required. The existing facilities of the naval gun factory are wholly inadequate for the purpose, and there are but few private establishments equipped to undertake work of this class. The principal tools at the naval gun factory have been in almost constant operation night and day during the past year, and as many as three shifts have been employed on the most important work. In spite of these efforts it has been impossible to begin work on the batteries of 12 important vessels, all but two of which are now in process of construction, the ten vessels ranging from 2 to 46 per cent. toward completion. As it requires as much time to manufacture the armament of a battle ship as to complete the ship herself, it follows that work on the guns should be commenced when the ship is begun, but existing facilities have not permitted such a course to be followed for a number of years.

Captain Pendleton's Views.

To enlarge the facilities now at the disposal of the Government, Captain Pendleton has recommended that appropriations be made to complete a building now authorized for a power plant extension, building and machinery for an electric power plant extension, gun shop for medium and small caliber guns, the extension of the east and west gun carriage and erecting shops, a new brass, iron and steel foundry, a foundry yard, a new forge shop, an extension of the gas plant, a locomotive house, a steel timber shed and a building for a pipe fitting establishment. These improvements are stated in the order of their importance, the requirement for a new power plant being especially urgent, as the present plant is greatly overtaxed. Captain Pendleton put special emphasis upon the requirement for a new gun shop for medium and small caliber guns, as it is in this department that the factory is chiefly lacking in facilities, the shop for large caliber guns being equal in all respects to the demand made upon it. The total cost of all the improvements urgently recommended by Captain Pendleton would be not far from \$4,000,000, but while appreciating the fact that this is a large sum to be expended in equipping a gun factory, he points out that the result would be a well balanced manufacturing plant of ample capacity for producing the entire armament of the navy as rapidly as new vessels are likely to be authorized by Congress.

Admiral O'Neil's Plan.

Admiral O'Neil, after a careful examination of the detailed report upon the subject made some months ago by a special board appointed for the purpose, has taken a somewhat different view of the situation and has suggested to the naval committee that it would not be advisable at this time to carry out the general scheme recommended by the board, which involved an expenditure of \$4,486,036. Admiral O'Neil stated that the unusual and extraordinary conditions now existing at the gun factory might not occur again, and gave it as his opinion that it was more than doubtful whether such an increase to the plant as was recommended by the board and by Captain Pendleton could be made in time to afford relief. Owing to accumulated work, the orders on file with the factory, not including unfinished work nearly completed, cover a total of 918 guns, besides several hundred minor caliber guns for secondary batteries, but it is doubtful if any such accumulation is likely to occur again. Admiral O'Neil, therefore, gave it as his opinion that the judicious course to pursue under the circumstances would be to seek such aid as could be afforded by the United States army gun factory at Watervliet, and to contract with private parties to such an extent as could be done with prudence, having due regard to the certainty of the completion of the work within the required time; getting as much work as practicable out the naval gun factory by making such additions and improvements as are absolutely necessary at this time to enable it to maintain its maximum degree of efficiency and as are most urgently required.

Referring to the details of the necessary improvements, Admiral O'Neil told the committee that while some relief could be had from the War Department as regards the manufacture of guns, none could be had as regards mounts, but as the making of gun mounts is not a special industry to the same extent that the manufacture of guns is, any large and well equipped machine shop could, under proper supervision as to inspection, &c., be trusted to manufacture them; consequently, the Admiral expressed the belief that with the aid of the army gun factory and by contracts with private parties the situation could be met, provided the most important projected improvements in the naval gun factory were authorized, involving the completion of a new boiler house, a steam plant, a coal storage and coal handling plant, and the erection and equipment of a building for an electric power plant, the new gun shop for medium caliber guns and a new brass, iron and steel foundry. These improvements, the Admiral stated, would be sufficient for the present, and were all that could well be undertaken at one time. Others would be necessary hereafter, but could be considered at a subsequent period.

With regard to the efforts already made to relieve the present situation, Admiral O'Neil stated that the bureau had recently executed contracts for 24 8-inch guns with the Midvale Steel Company and 36 7-inch guns with the Bethlehem Steel Company, while the army gun factory at Watervliet had undertaken to build 24 7-inch and 24 8-inch guns, making a total of 108 guns, or about 25 per cent. of the medium caliber guns for vessels now authorized. The contracts for the 60 guns let to private manufacturers aggregate nearly \$2,000,000, and the bureau calculates that in order to place them the Government has been obliged to pay 36 per cent. more than the work could have been performed for at the naval gun factory. It remains to be seen whether these guns and mounts will be completed within the prescribed time, but judging from experience, Admiral O'Neil expressed the view that they would not be.

Advantages of Government Shops.

While advocating a somewhat conservative policy as to the immediate expansion of the naval gun factory, Admiral O'Neil pointed out the manifest advantages of enabling the Navy Department to build all the guns required for the current development of the navy. No manufacturer would incur the heavy expense necessary to install a plant for making large and medium caliber guns unless he could recover the amount invested within

a moderate period of time, so that if the Government went outside of its own shops to procure the armament for its new ships, it must be prepared to pay in a short time the cost of such a plant as is necessary for its production. Under such circumstances it would be to the interest of the Government to invest a considerable portion of the money required for plants in its own shops, which it would then own and control, rather than to pay it all to private parties. A serious disadvantage in giving out guns and mounts to be made by contract is the fact that the Government loses control of the situation so far as their completion is concerned. Private establishments cannot give exclusive preference to Government work, whereas at the Government shops, if the armament of any particular vessel is behind, the whole resources of the establishment can be turned upon it. Recent experience also demonstrates that business reverses may overtake the best and soundest private establishments through no fault of their own, especially in these days of mergers and trusts, and they are more liable to suffer from strikes than are Government establishments.

It is probable that the Secretary of the Navy in making his recommendations to the House Committee will follow the general plan outlined by Admiral O'Neill, the execution of which will cost less than half that suggested by Captain Pendleton and the gun factory board. This is probable, because the committee is disposed to be very economical in providing money for the expansion of existing plants, preferring to devote current appropriations to a larger number of high powered war ships. As the committee seems to be unwilling to provide for the complete remodeling of the naval gun factory, it is likely that the limit of the appropriation will necessitate the submission of estimates by the Secretary carrying out the general scheme suggested by Admiral O'Neill. W. L. C.

Turbines for Scout Ships.

Plans for Installation In Two 3000-Ton Vessels.

WASHINGTON, D. C., January 9, 1904.—As the result of an exhaustive investigation concerning the adaptability of steam turbines for war vessels, the special board of engineer officers having the matter in charge have decided that the demonstrated efficiency of this form of motor is such as to justify the Navy Department in providing a turbine installation for two scout ships of approximately 3000 tons each, which it is proposed to ask Congress to authorize in the naval appropriation bill. A very fortunate conjunction of circumstances makes it practicable to continue the experiments for several months, while in the meantime provision can be made for one or more vessels in which approved types of turbines can be installed when the ships are ready to receive their motive power. Much time will thus be gained and the Navy Department's experiments will be given an additional practical value.

Construction Programme.

The programme of the Board of Construction is understood to involve the authorization of five battle ships of 16,000 tons each and two scout ships of about 3000 tons each. In addition to the recommendations of the Navy Department, however, a strong effort will be made in both Houses to provide at least five additional submarine boats.

The present plan of the Navy Department with reference to the use of turbines in the scout ships is to ask Congress to make immediately available the special appropriation of \$25,000 requested by Admiral Rae, chief of the Bureau of Steam Engineering, for experiments with turbines, and also an allotment of the estimated cost of the two scout ships sufficient to cover their engines and boilers. Without special provision neither of these sums would be available until July 1 next, but the Department desires that the investigation now on foot shall proceed as rapidly as possible.

Proposed Turbine Installation.

The size of the turbines to be used in the projected scout ships will depend, of course, upon the speed which they are required to develop under the plans of the Board on Construction. The board at present seems to favor 23 knots, to produce which in a vessel of 3000 tons it is roughly calculated that a 10,000 horse-power engine would be required. The board and the experts of the Bureau of Steam Engineering favor twin screws, but four propellers may be used on the two shafts. In the event that the Curtis two-stage type should be employed, two turbines would be used on each shaft. While the probable diameter of these turbines has been figured down as low as 16 feet in order to bring them under the protective deck, the experts of the bureau do not anticipate any difficulty in housing the upper half of the turbines, as the limit of the diameter of the engines is not the deck, but the bottom of the ship, owing to the fact that the center of the shaft is in line with the center of the turbine, and that to produce the best results the position of the shaft must be nearly horizontal.

The officials of the Navy Department believe that Congress will be keenly alive to the importance of adopting the turbine as a long step forward in naval construction. One of the familiar arguments against an unusually generous naval programme is the assertion that by the time the vessels authorized in any one year are completed such advances will have been made in naval architecture as to render them antiquated. For this reason the Department suggests that it will be well for the United States to be the first nation to equip large vessels with turbines for naval purposes.

Influence on the Merchant Marine.

While the chief object in view, from the Navy Department's standpoint, is the development of an improved engine for naval vessels, nevertheless, the bearing of these experiments upon the future of the merchant marine is not lost sight of. A prominent official of the Bureau of Steam Engineering, in discussing this phase of the subject, said to your correspondent:

The action of the Department in this matter should serve as an inspiration to the American shipbuilding industry. If the results are what we believe they will be, the advance will be of incalculable advantage to our shipbuilders not only in the construction of vessels for American ownership but for foreign account as well. It is exceedingly fortunate that the Navy Department has taken this matter up so energetically and in such a broad spirit, for the domestic shipbuilding industry will be relieved of the necessity of making costly experiments or of assuming risks of any kind.

The Department officials believe that the revival of our shipbuilding and ship owning industry depends not only upon trade conditions but largely upon a distinct advance along some important technical line in the very early future, and the adoption of the steam turbine seems to offer great promise. Fortunately for our shipping interests, early action can be expected on the Department's recommendations to Congress, and it is probable that before the machinery of the proposed scout ships is installed its economy, efficiency and endurance can be thoroughly tested by a board of trained officers. The shipbuilding industry would then be in position to take immediate advantage of this demonstration, and thus before the scout vessels are in commission those contemplating the installation of these engines in merchant ships could have before them definite data as to results that could be guaranteed.

Great innovations frequently depend upon apparently unimportant details, and the adoption of turbines may be the means of restoring to the United States that share of the world's commerce which we have possessed within the present recollection of many of the men who are now in control of our leading industries.

A series of hearings by the Naval Committees of both Houses will shortly be given to the Secretary of the Navy and the Bureau chiefs as the basis of the annual appropriation bill, which will probably be ready at least a month earlier than usual, as the House leaders now contemplate a final adjournment not later than June 1.

W. L. C.

The University of Illinois, Urbana, Ill., has purchased four lots adjoining its present grounds for the purpose of extending its engineering work. A steam engineering laboratory will be built, as will also a foundry. Each of these will be arranged for student instruction, as well as for experimental work along engineering lines.

Side Blow Converters.*

BY N. LILIENBERG, PHILADELPHIA.

Several publications on this matter have already been made, but the continued improvements and the arguments pro and con, based on different experience, make it desirable that this important question should again be discussed.

Steel makers are divided as to the economy of making castings from Bessemer steel blown in small converters with horizontal tuyeres. Large amounts of money and work have been spent on experiments, and some manufacturers have discarded the process after it had been duly installed and operated. This naturally causes others to hesitate and hampers progress. Everything depends on the method being carried out in the right way and that we know what to expect from it. Most of the previous publications have been made by agents advocating a special construction, claiming all possible advantages for it and hiding the disadvantages. I am agent for no steel process, and will try to take the independent stand of a manufacturer investigating whether it will pay him to erect such a plant.

The Markets for Different Castings.

It has been generally conceded that the superheated steel made in side blow converters cannot compete with open hearth and bottom blown steel for heavy castings and for ingots to be rolled and forged.

The field at present mainly assigned to it is: Castings of light weight, thinness and ornamental designs. It would be impossible to fix an upper limit for the weight, but I have been informed that several 10-ton castings have been made from 2-ton side blow converters, the superheated steel being retained in a ladle until the next charge is blown. The lower limit can be said to be only a few pounds. Side blown steel has a place between crucible and open hearth steel. The castings have mostly no higher carbon than 0.25 per cent., and it would be too expensive to melt such steel continually in crucibles.

In a general way it may be said that small castings from superheated steel may compete with cast iron, malleable iron, drop forgings, pressed steel and bronze. The competition with cast iron can only take place in such cases where lighter weight with the same strength is desired. This is especially the case with naval constructions and with running machinery, such as wheels of all kinds, cog wheels, pulleys, small truck wheels, &c. The competition with malleable iron will depend on many local circumstances. The annealing part of that process can only penetrate to a certain depth and takes a comparatively long time. In both respects steel has the advantage, but, on the other hand, the castings for malleable iron are more easily made, and the sink heads and gates much easier to remove and dispose of. There is undoubtedly a field for competition with drop forgings for a numerous variety of soft steel tools and other objects. This must, however, be limited to such cases where no special strength is required, because a drop forged article made from rolled steel is undoubtedly stronger than a steel casting. The same thing applies to cold pressed sheet steel, which has of late come into extensive use. In ornamental castings, bronze of course, takes the lead, but many objects are made of cast iron and painted to imitate bronze. There are, however, some lower limits beyond which it does not pay to make such small articles of cast iron, and then soft steel can take its place. It is doubtful whether such steel will come into use for stoves, because cast iron properly constituted will fill out all the ornamental designs required, and no special strength is needed.

Dynamo Magnet Steel.

It has proved possible to produce superheated side blown steel entirely sound, uniformly lower in carbon and manganese than any open hearth or bottom blown steel. As the manganese is above everything deleterious to the permeability, many tests have shown that with

the ordinary magnetizing force it has been possible to increase the induction about 10 per cent. by using the above named steel. This is what is claimed by M. Tropenas in a pamphlet, and has been corroborated by outside impartial parties. The permeability and hysteresis curves from such steel in fact approach those of Swedish iron. To demonstrate the great influence of manganese in this respect, I may mention a case which came under my observation of two irons where the permeability was greater, although the carbon was three times as high, only on account of the absence of manganese.

Centrifugal Castings

The many devices to make hollow steel castings in a rotary mold have been principally met by the obstacle that a large quantity of open hearth steel cannot be kept liquid long enough for casting, rotating and removing hollow ingots. But it seems to me that the question could be brought to life again now that superheated soft steel can be obtained in small quantities from side blow converters. Having made some investigations in that direction, I hope to return to it at another occasion.

Ingots for Rolling or Forging.

So far as I know these are not regularly produced in appreciable quantities from side and surface blown steel. It is impossible for a 2-ton converter to compete in cost of production with large sized bottom blown converters or open hearth furnaces. There are, however, cases where it seems to me advisable to make ingots in that way, for instance, when pig iron is not remelted but taken direct from a charcoal blast furnace, limited to a total cast of 2 to 3 tons. When the silicon does not exceed 1 per cent. the blows in the converter are sometimes troubled with spitting, and the steel is not quiet enough in the molds. It seems to me well, then, to raise the heat in the converter by burning the carbonic monoxide and to keep the metal less agitated. For well-known reasons it is not desirable to pour the steel too hot into cast iron molds for ingots, but this could be regulated by adding cold steel scrap in the converter. The last named conditions fit many of the Bessemer works in Sweden, but I am not prepared to advance this as a definite opinion before all conditions as to the economy are known.

Hard Steel.

As far as I know the bulk of the side and surface blown steel has carbon not above 0.25 per cent. I have not heard of any instance where higher carbon steel is produced by stopping the process earlier, but there are some cases where recarburization is accomplished by additions after the blow, for such grades as spring and common tool steel.

Chemical Analyses.

It has been claimed that side blown steel runs more uniform in composition than open hearth steel. I give here below some comparing analyses of steel castings made by both processes on acid lining, the figures reported having been taken from consecutive charges and not selected:

Open Hearth Steel, Newark, N. J.								
C.....	0.31	0.26	0.21	0.26	0.33	0.40	0.41	0.41
Mn....	0.47	0.74	0.45	0.74	0.75	0.74	0.55	0.56
Si.....	0.25	0.28	0.22	0.25	0.28	0.34	0.30	0.28
P.....	0.048	0.051	0.058	0.071	0.025	0.060	0.058	0.045
S.....	0.027	0.027	0.030	0.054	0.030	0.030	0.036	0.028
Side Blown Steel, St. Paul, Minn.—American Hoist & Derrick Company.								
C.....	0.27	0.28	0.26	0.28	0.24	0.24	0.24	0.25
Mn....	0.78	0.81	0.76	0.76	0.97	0.78	0.82	0.75
Si.....	0.25	0.28	0.23	0.29	0.26	0.23	0.25	0.21
P.....	0.051	0.050	0.049	0.051	0.048	0.053	0.052	0.045
S.....	0.034	0.039	0.033	0.037	0.024	0.033	0.039	0.039

It will thus be seen that the carbon is somewhat more uniform, but that otherwise the variations in the elements are about the same. The high and variable percentage of manganese comes, of course, mostly from the addition of ferromanganese.

A metal free from manganese for electrical purposes can only be produced in side blown converters by continuing the operation until the carbon is about 0.10 per cent. Steel thus produced has analyzed in average:

* A paper read before the Philadelphia Foundrymen's Association.

	Per cent.
Carbon	0.10
Manganese	Trace to 0.04
Silicon	0.02
Phosphorus	0.04

Some very mild bottom blown Bessemer steel has been produced, especially at Homestead and at the Bethlehem Steel Works, the carbon going down as low as even 0.07 per cent. and the silicon about 0.10 per cent. (in some cases even 0.04 per cent.); but the manganese is at the same time up to about 0.40 per cent. The pig iron to be used for the side blown converters need not contain over 1.5 per cent., because so much extra heat is obtained by burning the carbonic oxide inside the converter. This is an advantage, since silicon is an expensive fuel for the converter. I have recently got an inquiry for Bessemer pig iron of the following composition:

	Per cent.
Silicon	1.50 to 2.50
Sulphur, not over.....	0.04
Phosphorus, not over.....	0.04
Manganese, about.....	1.00
Total carbon, about.....	4.00

It is not stated whether it is intended for side or bottom blown, but there can be no doubt that it is for the last named. The manganese in the side blow pig iron should not exceed about 0.50 per cent., as it would, among other things, greatly increase the heavy wear of the lining.

Mechanical Properties

It has been claimed that side blown steel invariably is absolutely sound and free from blow holes. This ought to be modified so far that the metal is generally sounder than open hearth or bottom blown steel, but by wrong manipulation it is quite possible to produce honeycombed steel by the side blow method. That it is generally dead molten depends mostly on the great fluidity, which allows the gases to escape, and not on the fact that no air is driven through it. The results from pulling tests of side blown steel do not, on an average, indicate any superiority over good open hearth or bottom blown steel of same composition. The annealed side blown steel castings whereof analyses have been given above, with carbon 0.24 to 0.28 per cent., show mechanical properties whereof the following extracts may give an idea:

Elastic limit.....	29,350 to 42,900 pounds per square inch.
Ultimate strength.....	63,800 to 71,900 pounds per square inch.
Elongation	38.50 to 28 per cent. on 2 inches.

Just as with other steel, the annealing and forging improve the mechanical properties. Very good cold bending tests have been shown of side blown steel, but it has not been demonstrated that other sound steel of the same composition and treated in the same way cannot stand the same tests.

Advantages.

When the question confronts a manufacturer whether he ought to erect a plant for making side blown steel, the first thing to be considered is his facility for marketing the products. I have mentioned that for electrical purposes a new metal is produced simultaneously low in carbon and in manganese. Outside of that the advantage is not in the quality, but in the greater possibilities by obtaining superheated dead molten metal in small quantities. The bottom blown converter can produce small castings with the first part of the charge, but it takes so long to pour out the steel in that way that the metal would be cold at the end of the pouring and heavy skulls be formed. The open hearth furnace cannot produce steel hot enough for small steel castings without a great deal of expense in refractory material. On account of the high temperature of the side blown metal, it can be poured over lip from small ladles in the same way as ordinary cast iron from a cupola without leaving much skulls. It has even been found by some steel makers that side blown steel cannot be tapped from the bottom by a stopper, because the lining is cut out from the tap hole.

I quote here below literally three advantages from Bradley Stoughton's valuable paper on the subject before the American Institute of Mining Engineers:

The first cost of an open hearth furnace is much more than that of a converter plant, but thereby has been taken into consideration that on account of the length of time necessary to re-

pair a converter with fixed bottom, and because these repairs are necessary every 20 heats in the average, three vessels must be installed to keep one working continually, for at any one time one converter is working, one is repairing and the third is drying. A plant of three 2-ton converters would thus replace an open hearth furnace of from 50 to 70 tons daily capacity. The blowing engine and motor are of course much cheaper than for a bottom blown converter. Any blower of the two-impeller type capable of giving the necessary wind may be used.

The converter may be shut down and started up at short notice. An open hearth furnace must be run continuously to be at all economical, while the chief additional expense of running the converter intermittently is the small amount of fuel to heat up the apparatus before the first blow. This advantage, however, only applies to the following limited classes of manufacturers:

1. Those who have ample room and prefer to do their work by daylight.
2. Some cast iron and malleable iron foundries, who are frequently called upon to furnish steel castings to good customers, but do not have a large regular or steady demand. Under these circumstances they are wont to sublet such contracts to steel foundries, with the result of divided profits and occasional serious delays in delivery or defective castings furnished, for which they are accountable but not directly responsible.
3. Manufacturers who need a few thousand tons of steel castings per year to put into the product of their own factory, but whose requirements are not large enough to warrant running continuously an open hearth furnace of economical size. In the United States there are several concerns of this class, who have put in a side blow converter plant.
4. Open hearth foundries which have occasional desirable orders for castings not suitable to open hearth steel, on account of being small or with thin sections, or with special chemical requirements. Thus a good customer may desire small bevel gears in large quantities with high carbon to give good wear, or a locomotive works will often send out orders for several large castings together with a number of small ones. To get the desirable work the foundry may take the order and sublet the small work to another foundry at an actual loss to itself, relying on the larger work to make this up and also furnish profit for both parties.
5. Also in general any foundry expecting fluctuating orders. It is better to have a small amount of metal coming to the foundry at frequent intervals.
 1. Because of greater possible variation in chemical composition and consequent elasticity in fulfilling different physical requirements. Each unit of steel must be uniform in chemical composition, and with large units it is difficult to fit them exactly to the different orders. It is impossible to divide units into small units, unless the steel is extremely hot, because the steel loses too much heat by radiation on standing or during repouring. This is an advantage of constantly increasing importance with the more extended use of steel castings in many industries. Alloy steel castings, hard steel for wearing purposes, soft steel for ordinary castings, or extra soft for electrical purposes, are often called for, perhaps all in the same order.
 2. Because of the better arrangement of the work, since the pouring may be done by one gang who do nothing else, and become very expert at it in practice, while the rest of the shop is not interrupted at all in its regular work. When the pouring is done in large units it takes a number of men to do it, and the whole shop is more or less interrupted for 20 or 30 minutes three or more times a day, depending on whether the foundry is served by one or more furnaces. The amount of time lost in this way must be weighed against the wages of the extra men needed for continuous pouring, and each shop must strike its own balance. Again, the crane, or the apparatus for pouring, must be more powerful when pouring in large units. When pouring in small units and continuously, this apparatus is never available for anything but pouring, and an extra one must therefore be kept for the purpose.
 3. Because of the smaller floor space required for setting molds the work of molding, setting, pouring and knocking out can go on continuously in a small space, and this is a valuable economy in a foundry.

Disadvantages.

It is well known that several manufacturers have abandoned their plant for making side blown steel. The reasons generally given are waste of metal and of refractory materials. The normal difference of weight between the pig iron charged in the cupola and steel obtained at the mouth of the converters is 14 to 17 per cent. How much of this stands as actual waste in the converter is somewhat uncertain, because the melted pig iron is generally not weighed. But the loss in the cupola alone should not be above 5 per cent., and the total amount of silicon, carbon and manganese about 6 per cent. The remaining 3 to 6 per cent. is, of course, not much. But at several works the loss of iron amounts to considerably more than 17 per cent. and even runs up to 30 per cent. continuously for months. It is admitted that more iron is burnt in side and surface blown converters than in bottom blown, which is also evidenced by a greater amount of oxide of iron, thrown out in the shape of red smoke. There is also a complaint that the

side blown converter spits more slag and steel than the bottom blown. This, however, looks doubtful to me, and the side blow charges I have witnessed have, as a general thing, been absolutely clean. Excessive burning and throwing out of metal depends to a great extent on defective management; for instance, too cold iron, wrong composition of the pig iron, faulty regulation of the blast, burning out of lining and tuyeres, whereby the blast is not absorbed in straight, well defined lines, or wrong position of the converter. Altogether it requires more skilled labor and attention to manage a side blow than a bottom blow converter.

The greater waste of the lining depends on the higher heat, combined with a larger amount of oxidized iron, which saturates itself with more silica than resulting from the burning of the silicon in the pig metal. This was, of course, aggravated in the previous constructions, where the side blow was delivered under the surface, thus giving a rotary motion to the steel. It remains to find a more durable lining for side blow converters. The bottom is more rapidly worn than the sides, and the most recently constructed improved converters have therefore detachable bottoms, which means the whole lower part, including the tuyeres. This lasts 10 to 20 heats if it is to be kept in good order, and the superstructure lasts about 40 to 50 heats. By constant patching the lining in the Tropenas converter can last about 150 heats. In bottom blown converters the bottom lasts about 25 heats and the upper lining 200 to 300. The economy of refractory material, of course, depends also greatly on the quantity to be renewed. This is, of course, larger if the division line between the top and bottom is above than below the trunnions. In the last named case the bottom part can also be more easily changed. In the bottom blown converters the interchangeable part constitutes, of course, a much smaller percentage of the whole, as no part of the sides are attached to the bottom.

The waste of metal after the steel has left the converter is caused by three circumstances:

Spattering during the pouring, which amounts to 1 to 2 per cent., depending on the sizes of the castings.

Skulls in the ladles, which depends upon the heat of the metal.

Sink heads and gates which, of course, constitute a larger percentage the smaller the castings are. These can, of course, be made thinner the hotter and quieter the metal is. The work in getting off the sink heads is a considerable item in the making of small castings. They cannot, of course, be knocked off with a hammer, but have to be either sawed off close to the casting or chipped off, and the root ground, which is generally more work. This, of course, is a drawback in small steel castings by whatever process. The question should be carefully considered what to do with all this steel scrap, of which the sink heads and gates under normal circumstances constitute the largest proportion. When the converter plant is isolated the steel scrap will have to go into the cupola, and the amount thus to be consumed will generally have to be limited to 25 per cent. The steel requires more fuel to melt and a higher temperature. Besides the pig iron is thereby diluted, and the silicon lowered, which is the expensive fuel upon which the heat in the converter, to a great extent, depends. Then there is always danger of delivering the pig metal too cold to the converter if too much steel scrap is melted. The amount of scrap from small steel castings can easily exceed 25 per cent., and then the scrap heap in front of the cupola will constantly increase. The excess will have to be disposed of at a loss to open hearth steel makers. The side blown converter, therefore, works to best advantage in conjunction with an open hearth furnace, which can consume the scrap with expenditure only of coal and labor, leaving the cupola undisturbed for melting the pig iron.

Construction.

I will here only refer to those converters which are in practical use. As far as I have been able to ascertain, side blown steel is only made in America by the following three types:

The Tropenas converter, which has a double row of tuyeres, the upper one being intended to burn the carbonic oxide inside the converter, thus increasing the heat. The

tuyeres are either parallel or converge toward a point beyond the center of the converter. The upper or combustion tuyeres are rectangular or oval, with the large axis horizontal. Both rows of tuyeres pass through a projecting ledge in the lining of larger diameter than the converter itself, the object being to check the rotation of the steel. The distance between the rows is 4 to 7 inches. The diameter of the lower tuyeres is 1.25 to 2 inches, according to the size of the charge. One object of laying the tuyeres in such a concave ledge is that in case the metal runs into the outer, longer ones, warning is given before all are stopped up. The lower part of the converter is conical for 1 ton and cylindrical for larger sizes. The bottom is fixed and the relining is done through a manhole. As above mentioned, it is thus necessary for continuous operation to have three converters, one for repair, one to be dried and one in operation.

The long tuyere modification, as built by B. Stoughton, has only one row of parallel tuyeres, $1\frac{1}{2}$ to 2 inches, placed in the flat side of the converter. The constructor has the view that a better result can be obtained by burning the carbonic oxide close to the surface of the metal bath than 4 to 7 inches above it, as in the Tropenas construction, and that this can be accomplished by only one row of tuyeres. He also found that the second upper row, unless very carefully watched, is liable to furnish an excess of air representing a loss of blowing power and loss of heat by cooling. The tuyeres are made of iron pipes rammed into the lining, the ends projecting about 6 inches into the wind box. The distance between the tuyeres and the mouth is increased about 50 per cent. over that in the Tropenas construction in order to reduce the loss by spitting. The lowest part is detachable, so that only one or at most two converters are needed, because the bottoms give out earlier than the superstructure.

Both of these converters revolve in the ordinary way on trunnions, through which the blast is delivered.

The third of the side blow converted type in active operation is Evans-Wills, delivering the blast through flexible pipes and having the turning center below the bottom of the converter. The lower part with the wind box attached is removable from the superstructure and placed on wheels. After the blow it is rolled away and used as a ladle for casting in different places. A hole in the upper edge serves to rake out part of the slag.

In all side and surface blown converters the diameter and the depth under the tuyeres should not exceed certain limits if the action shall be thorough. I lay special stress on this because there are parties here who have spent lots of money and suffered agony of mind before they found out that the only trouble was too great a depth of the metal bath. Makers of small castings have generally stopped at 2-ton converters, but larger ones are contemplated. As it is not safe to increase the depth or diameter, the only dimension which could be extended is the width, making the cross section elliptical and giving the converter room for more tuyeres. This, however, has to be demonstrated by experience. The cupola melting the pig iron is either on the ground, when the liquid metal has to be lifted by an elevator to the mouth of the converter, or it is placed on a platform above the converter. In the former case the advantage is gained that the pig iron can be weighed and sample taken to find out whether the pig metal after being melted is suitable for the blow. But, on the other hand, one more elevator has to be furnished, which is more expensive than to elevate the raw materials for the cupola a few feet higher, and the pig metal loses some heat by being poured in a ladle.

As the blast pressure is only 4 pounds per square inch, and it is the question of volume and not pressure, an ordinary blower with ordinary two impellers can be used for cupola and converter alike. The power required is about one-tenth of that for bottom blown converters.

Operation.

As it is important that the blast should be delivered at an acute angle, just above the surface of the metal, the quantity admitted into the converter will have to be regulated accurately (in a bottom blown converter, of

course, no attention need be paid to this). After the filling the converter has to be placed just in the right angle by turning the wheel of the gear, opening the back of the wind box and looking through the tuyeres. The blast ought to strike the metal about half way across and be delivered in well directed parallel currents. Irregularity in that respect will cause more spitting. During the first period, 25 to 30 per cent. of the whole, only sparks and red smoke appear, the last named, from oxide of iron, showing up to a greater extent than in a bottom blown converter. The liquid metal is not at rest, but has the rotary motion of a wave, and the action can therefore only extend to a certain depth. As in all converting processes, the basic silicate of iron first formed acts on the carbon, thereby forming carbonic oxide, which helps to keep the metal in motion, although, of course, the agitation is much less than in converters where the air comes in under the surface of the metal. As the flame becomes white and strong during the boiling, the blast pressure is reduced to 3 or 3.5 pounds, and the converter is tilted slightly backward. During this boiling period, about one-third of the blow, there is no red smoke. Then the flame drops. Whenever the flame is short, red smoke appears. The spitting is worst toward the end of the boiling period. Then the flame lengthens a second time and becomes clear and white, until the final drop at the end of the blow, during which last period full blast is turned on. If spitting occurs during the last period there is something wrong in the lining, the tuyeres or the position of the converter. The blow of 2 tons lasts about 20 minutes. Analyses of the escaping gases show about the following proportions:

	Carbonic oxide. Per cent.	Carbonic acid. Per cent.
4 minutes from beginning.....	0.00	8.2
10 minutes from beginning, boiling.....	0.30	24.3
12 minutes from beginning, boiling.....	0.40	8.8
17 minutes from beginning, shortened flame.....	10.70	12.0
21 minutes from beginning, end.		

Corresponding analyses of gases from a bottom blown converter have appeared as follows:

	Carbonic oxide. Per cent.	Carbonic acid. Per cent.
4 minutes from beginning.....	3.95	8.59
10 minutes from beginning.....	19.59	3.58
14 minutes from beginning.....	31.11	1.34
18 minutes from beginning, end.		

It will thus be seen that in the side blow the carbonic oxide is well oxidized during the boiling, after that it is increasing until the end of the blow. At the late period when about 10 per cent. each of carbonic oxide and carbonic acid appear, there is also about 7 per cent. free oxygen. This also accounts for the apparent anomaly that the flame at the end of the blow is at least just as long as in a bottom blown converter for the same carbon. The analyses of gases from the last named show a steadily increasing amount of carbonic oxide. These circumstances make it, of course, more difficult to determine the carbon by the appearance of the flame in a side blow converter. But this is simplified because as far as I know the bulk of the side blown steel has either 0.25 or 0.10 per cent. carbon. Although the economy of heat in the converter has been several times dwelt upon, I think it would be of interest in connection with this matter to repeat some of the figures.

The units of heat developed by the combustion are as follows: Hydrogen, 34,462; silicon, 7830; iron, 1650; carbon to carbonic oxide, 2474; carbonic oxide to carbonic acid, 2403, and carbon to carbonic acid, 8080. The silicon, therefore, gives a considerable amount of heat which stays in the metal, the product being liquid. The iron gives some heat in burning, but this to a great extent is taken back when the iron oxide is reduced in contact with the carbon. Some heat must also be developed by the oxidation of manganese and by the combination of the silica with the oxides, although I have never seen an estimate of the last named. The oxidation of the carbon to carbonic oxide in the metal bath gives 2474 units of heat per unit of carbon, but only part of this is given to the steel, because the product of combustion escapes and carries away the bulk of the heat from that

source. By burning the carbonic oxide outside the metal bath and inside the converter additional heat is obtained to the extent of 2403 units of heat per unit of carbonic monoxide. But inasmuch as 1 unit of carbon corresponds to 7.3 units of carbonic oxide, the additional heat thus gained referred to the unit of carbon in the pig iron will be $7.3 \times 2403 = 5607$ units. This is quite a considerable increase, but only a limited amount of this is imparted to the steel, the bulk of the hot gases instantly leaving the converter. The result would, of course, be better if it were possible to construct a converter in such a way that the gas currents above the metal bath would not be so rapid. Although the metal is very hot and liquid, it is well to add some ferromanganese to be sure of absolutely quiet steel before casting. The casting should not be made before skippers have absolutely disappeared even when a dry rod is immersed a few inches. The slag must, of course, be removed more carefully in casting over lip. In the Evans-Wills converter it is raked out through a side hole in the detachable under part. In some operations with ordinary side blow converters sand is shoveled in through the mouth of converter when turned down after the blow, thus forming a tough slag as a cover, which does not follow the steel. A dam of fire bricks is then formed and the steel is tapped through the lowest part of the mouth.

Looking back on the many devices proposed and tried, it seems almost impossible to get any more improvements in the same direction patented. The idea of burning carbonic oxide inside the converter to increase the heat is about 25 years old, and the first converter, in 1856, had side tuyeres. Practically all that has been done during that long period is the arrangement of the side tuyeres, and it is therefore rather strange that the progress has been so slow.

We have been taken by so many surprises that it is impossible to tell what the future will bring. It seems to me that a part of the off-going heat could, in some way, be utilized to heat the blast, and that additions of ferro-silicon during the blow have not been sufficiently tried. Some small converters are in use for melting pig iron for malleable castings and for brass in which a flame generated by a spray of petroleum is used. Perhaps under certain circumstances some addition of heat in this shape during side blows for steel making would be economical, thereby permitting a lower silicon pig iron. It is also possible that a small open hearth tipping furnace may be designed for the same purpose as the side blow converters with facilities for raising the heat and with lining refractory enough to withstand it.

Discussion.

In the course of the discussion which followed the reading of the paper, it was said that representatives of many of the various converters, both in this country and abroad, would not deny losses as high as 20 per cent. in regular practice. Some users of these processes claimed that they had, under normal working conditions, kept the loss down to 14.5 per cent.—that is, the loss of metal as delivered at the mouth of the converter. Twenty per cent., it was said, was a good average percentage of the loss in conversion under normal conditions. When 35 per cent. was lost there was evidently something wrong in the operation or manipulation. In comparison, it was stated that the conversion loss in the open hearth process varied from 4 to 8 per cent.

The percentage of good castings obtained from side blow converters, it was claimed, depended entirely on the class of castings made and the condition of the metal when poured.

Regarding the amount of scrap that could be economically used in these processes opinion differed; 25 to 30 per cent. was generally said to be about the best that could be done, although it was claimed that there were cases when 75 per cent. had been used.

There was considerable discussion regarding the linings of these converters, and it was admitted that there was room for considerable experiment and improvement in this respect. The usual method of lining is with silica brick, and the patching is done with ganister. Some line with brick near the divisions only, and ram ganister

into the other portions of the converter. Most of the users of the present day converters use ganister mixtures which they have by experiment found best suited for their particular practice. In one case 70 heats of 5000 pounds each were run without overhauling the lining, while others were cited as running 1000 heats or 2 tons each without completely relining the converter.

Lake Superior Mining News.

Exploratory Operations.

DULUTH, MINN., January 10, 1904.—Operations in the Lake Superior region do not increase with the new year and are not expected to do so till toward the opening of navigation, which may be quite late this season. Exploratory operations seem a trifle more active, and several new undertakings are about ready. Three diamond drills are to be worked in the L'Anse district of the Marquette range, the first probably being already in operation. It is reported that several drills will be put at work in the south part of Aitken County, Minnesota, by the Oliver Iron Mining Company. This is a section that had a mine excitement a number of years ago, and three drills have been working there for some months, two for the Orelands Company, a Duluth concern, and one for St. Paul parties. The whole surface is covered thickly by drift, and with the exception of a few places, where diorite and quartzites show, there are no outcroppings. The Oliver Company do not admit that they are to have drills there.

Beta and Nanaimo mines, near Iron River, Menominee range, are probably to be shippers the coming year. They have been under option to E. F. Brown, of the Pewabic Company, for some months. Beta has been unwatered and the shaft is now going down 150 feet, with good indications. A powerful machinery plant has been installed. Nanaimo was first explored in 1881, and between that year and 1891 shipped 127,000 tons. Beta shipped for a few years prior to 1891, but both have been idle since then.

A splendid new compressor plant, built by the Sullivan Company, is now being erected at Aragon mine, Iron Mountain. The machine is 210 horse-power and for 150 pounds pressure. A reheating steam receiver is placed between the high and low pressure cylinders, the passage of steam sometimes being so slow that condensation would be great. The compressor is to furnish air to Porter compound mine locomotives at 850 pounds pressure. It works up to 1200 pounds.

The Pewabic Mining Company have let their contracts for mine timber, 500,000 feet to be used the coming year. This has all been taken by local Iron Mountain jobbers. With a reduction of wages, announced last week, the management of the Loretto Mining Company gave a 25 per cent. decrease in rents, all mine dwellings being their property. This nearly offsets the wage cut at that mine and is very gratefully received by miners. The two mines in Felsh Mountain, opened last year by G. A. St. Clair of Duluth, have been closed down indefinitely. It was hoped by Mr. St. Clair that he could run through the winter, but sales were not made. These mines are old explorations revived by him, and they are most promising properties.

Newport mine, Gogebic range, has closed, throwing out 150 men; this is one of the Schlesinger properties. At another of the same group, Newport, 100 men have been let out and mining will be carried on slowly. At the Bonnie shaft all men are laid off till the new machinery plant is installed. There may be other reductions in force on the Gogebic in the near future. At Tilden, which was a large property but a short time ago, they are now hoping to find something under the big dyke at the bottom of the mine, and are sinking No. 6 shaft for that purpose. The rest of the mine is about worked out and will soon be abandoned. It is quite possible that more ore may be found lower down.

At Maas mine, Negaunee, they are 85 feet in ledge with the shaft, and are cutting out a room for two pumps of 1400 gallons capacity each. The Cleveland Cliffs Company are putting a tremendous amount of

money in this shaft and property, and cannot be taking out ore until 1905.

Exploration in Canada.

Leonidas Merritt and a party of Duluth men have been exploring during this winter in the southern part of Hunter's Island, north from Minnesota, and have run tunnels into a mass of iron ore averaging about 50 per cent. and containing some little sulphur. It is believed that as they get deeper into the formation the iron will improve and the sulphur will disappear. This is the most favorable exploration so far carried on in the region north of Minnesota, on the continuance of the Vermillion range formation. Where this party is working is between Carp Lake and That-man's Lake, but some prospecting is in progress between the last named lake and This-man's Lake, and still further on to The-other-man's Lake. Iron ore locations were mapped here in the reports of the Geological Survey of Canada as far back as 1890 and in subsequent years, and these cropings of jasper and lean ore have been examined and commented upon by Messrs. Van Hise and others of the United States Geological Survey. The formations are very strong and persistent, and there is a greater width and length of jasper and lean ore than is to be found in any other portion of the Vermillion range formation, either side the international line. The general formation is the Keewatin, quartzites, soft gray schists, altered quartz porphyries, with large areas of greenstone and clay slates. The International Iron Mining Company, Limited, have been organized under Canadian laws, with \$1,000,000 capital, and are carrying on the work begun by Mr. Merritt.

Ore Railroad Statistics.

More ore was handled during the past year by the Chicago & Northwestern Road than by any other railway in the Lake Superior region, this amounting to about 5,725,000 gross tons, as follows: To Escanaba from the Menominee range, 2,800,000 tons; from the Marquette, 713,000 tons; from the Gogebic, 5000 tons; to Ashland from the Gogebic range, 2,025,000 tons; all rail, 180,000 tons. The nearest approach to this quantity was by the Duluth, Missabe & Northern to Duluth, 5,256,000 tons. In the way of revenue, however, the Duluth & Iron Range Road exceeded all others, with gross receipts from ore traffic alone of \$4,400,000, and the Duluth, Missabe & Northern came next with \$4,285,000. The Chicago & Northwestern had gross receipts approximating \$2,300,000 from its ore traffic. The invasion of the Chicago, Milwaukee & St. Paul and the Wisconsin & Michigan does not seem to have had a very serious effect upon the business of the Northwestern. It is interesting to note that the two roads belonging to the United States Steel Corporation had a combined ore revenue the past year amounting to \$8,700,000, of which it is generally supposed that not far from 40 to 50 per cent. is net. In the recent reductions in salaries among constituent companies of the United States Steel Corporation, these two roads did not share.

The Milwaukee road has put into service on its ore line from Escanaba to Menominee range points Vauclain compound locomotives, weighing, without tender, 220,000 pounds. These locomotives will haul against the grades on this line 1400 tons of revenue load. The Duluth, Missabe & Northern road is relaying all its main line branches with 80-pound steel, and will have that weight between terminals. It is also to build a branch to the new Higgins' mine in 4-58-17, in addition to the spurs, already referred to, to the Monroe, Niles, Clark, Chisholm and Shenango.

The Pittsburgh Steamship Company.

It has been stated to a committee by James Gayley, vice-president of the United States Steel Corporation, that no change in the location of headquarters of the Pittsburgh Steamship Company would be made, and that the company's business would remain in Duluth, as heretofore. It had been feared that Mr. Coulby, on taking charge, would remove the offices to Cleveland, which is his home, and an important vessel center. The committee represented to Mr. Gayley the good feeling existing in Minnesota toward the Steel Corporation, a sentiment

diametrically opposed to that held a few years ago toward some of their predecessors, and due chiefly to the policies of present Western officials of subsidiary companies, who are in direct touch with the public. It is important for the Steel Corporation that this feeling continues, more important possibly than may appear on the surface; and it is the earnest wish of the Western officials that no step be taken that may weaken the friendliness now manifest. That the removal to Cleveland, without strong reason, of any such offices as those of the Pittsburgh Steamship Company would have an unpleasant effect is quite possible. But the assurances of both Mr. Gayley and Mr. Coulby on the subject may be supposed to have settled the matter.

D. E. W.

Fire Hazard An Element in Manufacturing Costs.

BY HARRY D. GUE, BROOKLYN, N. Y.

It may be stated roughly that a manufacturer's profit earning capacity is in due proportion to his knowledge of factory costs and his ability to stop the leaks; to the ingenuity with which he collects and tabulates the smallest details of his plant and its operation, and the promptness with which the errors thus shown are rectified. The past ten years have shown tremendous impetus given to an investigation of this subject, the work having found expression in technical journals generally. The cost of many of the standard articles of manufacture is known to within one-tenth of 1 per cent., and it is hardly an exaggeration to say that the doing away with a single screw in a piece of mechanism may render it a commercial possibility.

In spite of this, refinement of business management can scarcely come from any but continuous work, and it is beyond question that too many manufacturers fail to appreciate the all-embracing importance which the fire hazard plays in the conduct of their business. Interruptions in the output of individual factories, especially if of considerable duration and at a time when rivals are busy, are always serious. Trade is diverted, workmen disperse, and the entire organization is temporarily if not permanently crippled. But two things are apt to tend to such a condition; a long strike or a serious fire. Strikes may or may not be avoided. The fire hazard, on the other hand, may be reduced materially in nearly every factory in the land. It may be reduced to a point in fact where the probability, not that a fire will not start, but that the resultant loss will be insignificant is made almost a certainty. Plans and specifications for bringing about such a result are already in existence, and may be had by any manufacturer for the asking.*

The indemnity feature of fire insurance, representing, as it does, the co-operation of the many for the benefit of the few, and in such protection distributing yearly to the few above \$150,000,000 collected from the many, is absolutely essential to the transaction of business and the extension of credit. The permanent and lasting value of fire insurance organization lies, however, in the concerted work thus made possible to reduce the fire hazard.

Few other national questions concern us so deeply as the reduction of our fire waste, amounting annually to upward of \$200,000,000, while surely no other national question of anything like equal importance is given such grudging attention on the part of those most vitally interested—the owners and occupants of buildings. Part of the difference is due, no doubt, to an active reluctance to conform to any suggestions or requirements of underwriters. The principal cause, however, lies in a failure to take with due seriousness the educational work of fire insurance engineers.

The foundation of modern fire insurance may be stated briefly as follows: A contract for fire insurance indemnity is made for a premium consideration, based on

the general likelihood of fire loss occurring under conditions similar to those in the particular risk insured. In other words, although not strictly accurate, fire insurance costs in proportion to the likelihood of fire loss in so far as underwriters have been able to solve this enormously difficult and complex question.

Fire insurance engineers have gone to great pains in tabulating the causes and effects of fire, together with the strength or weakness of contributing details, and to-day underwriters are so sure of these results that they will vary between wide limits the premium charged for a given amount of indemnity, depending on how nearly the owner will bring his property up to the standard of safety set by the underwriter. Some of these improvements bear a splendid interest in the reduction of the premium rate on the investment; others make but a meager return, yet are of no small value when the greatest security is desired.

Until very recent years it was customary to class many items of factory expense in the category of "fixed expenses," which are now subject to more or less steady decline, as systematic care is brought into effect. Under the present system of schedule rating, fire insurance is no longer a fixed expense. It is determinable largely at will. It depends to a great extent on the adoption of features of construction and types of perfection advised by fire underwriters. As such it is a variable increment of factory cost, while the protection which fire insurance engineering can now afford against interruption and loss, and the degree of confidence which it brings through the lessening of future uncertainties, though not easily expressed in dollars and cents, lend a measure of courage deserving of a prominent place in the assets and earning capacity of the factory.

It is impossible to detail here the various ways and means which may be adapted to reduce the fire hazard in any given risk. Fire insurance engineering has brought out some very valuable general facts. For example: Vertical openings from floor to floor are more to be feared than any other feature of construction; unprotected iron is far less fire resistant than heavy wood; outside windows may be protected by tin clad wooden shutters or windows of wire glass, and nearly one-third of the total fire loss eliminated; textile mills, formerly so dangerous that insurance was difficult to get at any rate, are now, largely through the introduction of the automatic sprinkler, among the safest of structures, &c.

Many manufacturers have taken advantage of all that underwriters have to offer in their construction of recent factories, and the results are subjects for congratulation. Among these may be cited the works of the Westinghouse Electric & Mfg. Company, the Brown Hoisting Machinery Company and the Allis-Chalmers Company. If improvements tending to reduce the fire loss are given such thorough recognition by fire underwriters, who have only property damage to consider, how much more must be the concern of the factory owner, who faces not only property loss, but interruption or divergence of trade, and all the train of misadventures which follow an unexpected shut down?

Carnegie Blast Furnaces Starting Up.—A number of blast furnaces in the Pittsburgh district belonging to the Carnegie Steel Company are to be started up as soon as possible. At the Edgar Thomson plant, which consists of 11 blast furnaces, there were in blast on January 1 only three stacks, two of which were running on spiegel and ferromanganese, and the other on Bessemer iron. Already furnaces H, J and K, at the Edgar Thomson plant have been started, and other stacks will be blown in at an early date. It is expected that before this week is out four more of the Edgar Thomson furnaces will be started, making seven stacks started at this plant within a week. Of the five Carrie stacks one was out of blast on January 1, and this will also be started at an early date, as will one of the Duquesne furnaces, which was also out on January 1. The three Isabella stacks of the Carnegie Steel Company, at Etna, were all idle on January 1, and it is not likely these stacks will be started for some time.

* A line to the National Board of Fire Underwriters, New York City, or the Factory Insurance Association, Hartford, Conn., will bring the desired information.

The Pacific Coast Feeling Cheerful.

SAN FRANCISCO, CAL., January 4, 1904.—At last we have left 1903 behind, and have entered joyfully on the work of another year. It is true that we have not had as much rain as we could wish, but there is no reason to be discouraged on this account, and no doubt we will have all we need, and have good crops over the major part of the State. The sections where rain seems to be most needed now are in the lower San Joaquin Valley, on the southwest coast and the south. These sections, though very important, have more or less irrigation, so that the lack of rain does not mean so much to them as it does elsewhere in the State. They also have material resources that are, to a certain extent, independent of rainfall, as here is the great oil belt of California, where there has been an increase of about 60 per cent. in production during the past year.

As regards San Francisco and Northern California, we could not very well have had a better business year. This is shown by the Clearing House exchanges, which were \$1,520,198,682 for 1903, against \$1,373,362,025 for 1902. These exchanges have doubled in the past seven years. This means a greatly enlarged trade, especially in the hardware and metal lines and in our manufactures, in which there has been an increase in sales of 10 to 15 per cent. That there will be an equally good record shown by 1904 is evident when it is known that machinery, hardware, pipe, boilers, engines, &c., will be needed in increasing quantity in the oil sections and in the lumber counties. The cut of redwood increased from 317,000,000 feet, in 1902, to 423,000,000 feet, in 1903, and the additions made to the capacity of the mills last year renders a cut of over 500,000,000 feet possible in the present year. Here the use of machinery, &c., and hardware of all sorts may be expected to take a big upward jump. This is true not only of the redwood section, but also of the sugar and white pine section, where every stick cut has been sold, and where the production was restricted by the lack of cars that will be provided after the mills have again started to work in the spring. Reference has been more particularly made to California, but what is said of it is true also of Arizona and other sections on the coast. Should hostilities break out between Russia and Japan, this city will be the great center from which supplies must be immediately drawn, although Portland, Tacoma and Seattle will also have their share.

A new railroad tariff goes into force by the 15th of this month, which adds considerably to the cost of shipping goods by rail. Hardware, iron and steel, machinery, pipe, wire goods and a multitude of others in this line will be affected. Though this will add eventually to the local cost of these articles, it will for the present be of more benefit to the business man than otherwise, as it will give him an opportunity of getting rid of his stock more rapidly, the retail trade being anxious to purchase before the new tariff takes effect in putting up the price of goods. It will further give an opportunity to local manufacturers of such goods as come into competition with Eastern made to turn an honest penny.

J. O. L.

The brass industry of the Naugatuck Valley is starting up again, after shutting down for taking inventory. The mills are not as busy as they were a year ago at this same season, but the indications are for a very good business. Last year and the year before saw an abnormal prosperity in the brass business, so that a comparison does not tell the whole story. To-day the condition is what the brass people term normal. Some departments are already very busy and are running nights. It is always the case in the Naugatuck Valley that some departments are rushing while others are somewhat slack, a good deal depending upon the season. At some periods of the year certain departments are usually busy, while other are slack, and *vice versa*. Taken altogether, it looks like a good, normal condition, concerning which there is no cause for worry.

Homestead Men Object to the New Wage Scale.

A considerable number of the skilled employees of the Homestead Steel Works, of the Carnegie Steel Company, object strongly to the lower scale of wages at this plant, which went into effect on January 1. Some of the men have refused to work, and a number of conferences have been held between A. R. Hunt, general superintendent, and the dissatisfied employees, who think the wage reductions in some departments have been excessive. In place of the scale offered by the Carnegie Steel Company the men presented a scale to A. R. Hunt, general superintendent, drawn up by themselves, which they claim equalizes the reductions and is a compromise between the wages ruling in 1903 and those offered by the company for this year. We present below the old scale of wages, the new scale offered by the company on January 1, and the scale proposed by the men. These scales show the rate of wage to be paid per 100 tons of output and are as follows:

	Old rate.	Company's scale.	Men's scale.
Heaters	\$2.72	\$1.74	\$2.00
Rollers	2.72	1.74	2.00
Manipulators	1.97	1.35	1.35
Cranemen	1.44	.87	1.23
Back table men.....	1.07	.97	.97
Greasers .....	.84	.65	.84
Bottom makers.....	1.76	1.16	1.50
Bottom makers' helpers.....	1.45	.87	1.23
Pit and tong men.....	1.44	.73	1.22
Pit and tong helpers.....	1.26	.65	1.07
Buggy men.....	.97	.80	.90
Recorders .....	.80	.65	.80

It will be noticed that the back table men and the manipulators are willing to accept the scale offered by the company, but they join with the others in the request for what is claimed to be a more equitable readjustment. In all about 500 men are employed in the 40-inch mill.

In other mills the same process of forming a new scale is going forward, it is said. This is the case in the 35-inch and the 30-inch mills at least, where scales have been prepared and presented to General Superintendent Hunt.

The men employed in the 48-inch mill of the Homestead Steel Works also object to the reduction in wages, but are willing to accept the following scale, which shows the old rates of wages, the new rates proposed by the company and also the rates proposed by the men, as follows:

	Old rate per 100 tons.	New rate per 100 tons.	Proposed per 100 tons.
Rollers	\$5.50	\$2.94	\$3.87
Heaters	4.00	2.21	2.20
Shearman	2.00	1.10	1.60
Heater helpers.....	1.63	1.28	1.40
Ingot yard cranemen.....	1.25	.83	1.10
Ingot yard foremen.....	1.55	1.10	1.35
Pullups .....	.90	.52	.81
Delivery cranemen.....	1.45	1.01	1.25
Sweepers	1.50	1.03	1.30
Guidesmen	2.25	1.38	1.85
Greasers	1.45	.93	1.25
Screwdown	2.90	2.02	2.50
Leverman	1.94	1.32	1.50
Straighteners	1.32	1.01	1.20
Tableman	1.94	1.29	1.60
Markers	1.94	1.42	1.75
Scrappers	1.14	1.01	1.01
Line drawers.....	1.00	.81	.90
Shearmen	2.25	1.38	1.74
Shear helpers	1.56	1.01	1.30
Weigh master.....	1.50	1.01	1.30
Recorders	1.20	.81	1.10

In case the Carnegie Steel Company insist upon the original reductions, which were to become effective on January 1, some labor troubles may take place at the Homestead Steel Works, but it is expected that the entire matter will be arranged during this week.

The American Steel & Wire Company will have no programme of improvement for this season. Considerable work remains to be done in completing improvements begun last season, under the large appropriation from the United States Steel Corporation, and this will be finished; but no new work of enlargement of any size will be taken up.

OBITUARY.

WILLIAM PALMER.

Among the many sad deaths at the Iroquois Theater disaster in Chicago recently none were more so than that of William Palmer, of Evanston, Ill., and his entire family, consisting of his wife and two sons. Mr. Palmer was born in Schuylkill County, Pa., June 26, 1864, and commenced work at the age of 11 years in the coal mines of Pennsylvania for the William Penn Coal Company and continued with them for about 12 years, during which time he was promoted to telegraph operator and assistant bookkeeper. From there he went to Carlisle, Pa., to take the position of chief clerk for the Carlisle Mfg. Company, and left them to become assistant superintendent of the Brooklyn, Bath & West End Railroad under John P. Heindell, superintendent. He then was connected with the American Car & Equipment Company of New York City. In 1892 he became the traveling representative of the American Tile Works of Boston, in



WILLIAM PALMER.

whose service he remained until 1899, when he resigned to become general sales agent for S. F. Bowser & Co. of Fort Wayne, Ind. For the last two and a half years and up to the time of his tragic end he was the traveling representative in the West for the Benedict & Burnham Brass & Copper Company, one of the constituent companies of the American Brass Company.

No one had more or warmer friends in the trade, and being a hard, honest and conscientious worker, he controlled almost the entire trade in his territory. He was a member of Aurora Grata Lodge, No. 756, F. and A. M.; Constellation Chapter, No. 209, R. A. M., and Clinton Commandery, K. T., all of Brooklyn, but about a year ago demitted to Evanston Lodge, Evanston, Ill.

NOTES.

GEORGE A. SAUNDERS, proprietor of the Pepper Machine Works, Lakeport, N. H., was accidentally drowned while fishing in Lake Winnepesaukee, N. H., on December 24, 1903. He was born in Gifford, N. H., 52 years ago and became connected with the machinery business of W. H. Pepper, at Lakeport, in 1875, eventually becoming proprietor of the concern.

GEORGE W. STROMAN, superintendent of the machine shops of the Bethlehem Steel Company, South Bethle-

hem, Pa., died December 31, 1903, after a very brief illness, from paralysis of the stomach, aged 43 years. Mr. Stroman was a former burgess of the town of Bethlehem, and was well known and highly respected in the community.

FREDERICK CHASE, president of the Pennsylvania Galvanizing Company, Philadelphia, died January 7 at his home in that city, aged 64 years.

HAMILTON RUDDICK, a mechanical, constructing and consulting engineer, died January 7 at his home in Brooklyn, N. Y., aged 78 years. He was born in St. John, N. B., and came to this country as a young man. He held a number of important positions in Eastern cities and carried out much work of importance in the course of his business life.

HENRY T. WINTER, formerly proprietor of the Vulcan Iron Works, Minneapolis, Minn., died January 1, in Houston, Texas, in which city he had made his home in recent years. He was born in England and went to Minneapolis in 1870, where for many years he conducted the Vulcan Iron Works on Nicollet Island.

HOWARD W. WHITE, who ran an iron and steel brokerage business under the firm name of Howard W. White & Co., with desk room in the Old Colony Building, Chicago, died suddenly at his home in Chicago, January 7. Previous to his embarking in business on his own account Mr. White had been employed by Joseph T. Ryerson & Son.

JOHN TIMMES, a retired iron, steel and metal merchant of New York City, died January 8, at his home in Brooklyn, N. Y., aged 81 years. He was born in Germany and came to this country when a lad.

HENRY MAURER, president of the firm of Henry Maurer & Sons, dealers in fire brick, of New York City, died January 10, aged 74 years.

EDWARD J. SCHMIDT, treasurer of the P. Lowentraut Mfg. Company, Newark, N. J., died on the 1st inst.

DAVID FRANK CORSER of the firm of J. J. Gerrish & Co., general supply agents for oils and steam fittings at Portland, Me., died at his home in that city Wednesday, December 30, aged 68 years. He was deputy store keeper and store keeper for the Grand Trunk Railroad for 40 years until 1879, when he became an active partner in the Gerrish business, in which he had been a silent partner for a number of years. At the time of his death he was the sole owner of the business.

The Baldwin Locomotive Works, Philadelphia, Pa., have just received an order for 30 locomotives from the Delaware, Lackawanna and Western Railroad Company, the aggregate cost of which will be about \$500,000. It is said that this is but one, though the largest, of many orders recently received by Baldwin's, and that the prospects are exceedingly favorable for a busy time from now on. The Lackawanna's order is for the latest improved type of double-cylinder locomotives. They are to be delivered by April 1. The orders now on hand will necessitate the turning out of from 30 to 40 locomotives every week. Eight large locomotives will be shipped in a few days to Korea.

The United States Steel Corporation, from their plants in Pittsburgh and vicinity, sent 3256 tons of new steel rails abroad in December. Nearly 2000 tons in two lots went to Australia. Costa Rica was forwarded 785 tons, while a shipment of 472 tons went to Bocas del Toro, Colombia. The Corporation also made exports of 348 tons of structural steel in about equal proportions to Cuba, Mexico, China and Japan. Steel billets, representing a tonnage of 2078, went to British ports, Liverpool having been sent 1648 tons, while the balance went to Newport.

Notices have been posted at the Homestead, Bessemer and Duquesne works of the Carnegie Steel Company that hereafter only straight time will be paid for overtime and night work. It has been the practice heretofore in these plants to pay time and half or double time for overtime and night work.

The Iron Age

New York, Thursday, January 14, 1904.

DAVID WILLIAMS COMPANY,	- - - - -	PUBLISHERS.
CHARLES KIRCHHOFF,	- - - - -	EDITOR.
GEO. W. COPE,	- - - - -	ASSOCIATE EDITOR.
RICHARD R. WILLIAMS,	- - - - -	HARDWARE EDITOR.
JOHN S. KING,	- - - - -	BUSINESS MANAGER.

Business Failures in 1903

The returns of commercial insolvency for the past year, which have been published in *Dun's Review*, afford much food for thought. According to these returns, the commercial failures in this country aggregated 12,001 in 1903, with total liabilities of \$156,633,859. A heavy increase is thus shown over the commercial mortality in 1902, when the failures numbered 11,615, with liabilities of \$117,476,769. In 1901 the failures had been still fewer, with much smaller liabilities. These statistics demonstrate the severity of the check that general trade received in the year just ended. Notwithstanding the increased mortality thus shown, there is cause for congratulation that the extent of the business reverses was not very much larger. It was a most trying period for many business men, in view of the manner in which populous sections of the country were scourged by drought or floods, while in important branches of trade manufacturers and merchants contended with falling prices, a shrinking demand and curtailed credit. It would not have been surprising, under such circumstances, if the mortality in 1903 had been double that of the previous year.

As far back as 1899 many business men were deeply concerned because of the great expansion which was then apparent among their customers. The manner in which manufacturing consumers had extended their operations caused no little anxiety, as it was feared that too much was being undertaken for the capital controlled. The country had so recently emerged from a severe depression covering the greater part of the decade that the lessons of caution taught during that period were still very fresh. It was, therefore, quite natural that anything which savored of expansion should be regarded with suspicion. The great prosperity of the succeeding years could not be foreseen. These misgivings, of course, proved to be groundless, it being afterward shown that the expansion was an absolute necessity, having been brought about by the tremendous increase in the consumptive requirements of the country. Nevertheless, those who had charge of the credits of important establishments kept close watch of developments during the time of rushing demand and were conservatively prudent in guarding against granting too much credit to their customers. It would have been much easier and often more agreeable under the circumstances to have given way to the buoyant influences of the era of heavy trade and to have encouraged overtrading. The care taken in scrutinizing credits has had its reward in the comparatively moderate volume of commercial insolvency during the year just ended.

Undoubtedly an important influence in maintaining trade on a sound basis in the recent past has been the shortening of terms, which was such a prominent feature of the depression of the past decade. Those whose business experience antedates the 90's will remember that four months' credit was then quite common in important branches of the iron trade. Even those who at-

tempted to maintain a time limit of 60 days quite readily granted extensions when requested. The shortening of terms was impelled to a considerable extent by the financial stringency following the panic of 1893, and this tendency was further strengthened when manufacturing interests began to consolidate. It was found, then, to be a comparatively easy matter to reduce the time limit. The widespread adoption of the 30-day period in the iron trade has certainly been the means of keeping a much closer check on all customers. It has been much easier to safeguard interests than when terms as long as four months were the rule. This tendency toward the shortening of terms was not relaxed with the recurrence of good times; but, on the contrary, it is extending into other branches in which long credits have been the rule. While it will never be possible to guard completely against insolvency, it is possible to keep it from reaching extravagant proportions. Among salutary influences high rank must be given to the shortening of credits and the closer approach to a cash basis.

A Federal Corporation Law.

The very radical and rapid changes which legislatures of various States are making in their corporation laws cannot fail to have their effect in unsettling business conditions in certain sections of the country. Instances keep coming to light where these changes have a direct effect upon business, and the condition is one that is apt to become worse rather than better as time goes on. One result is that advocacy of a general corporation law to cover the entire country is becoming more frequent and more earnest. As the matter stands to-day the whole tendency of the changes in corporation laws is along selfish lines, in that each of a number of States is making inducements to corporations to take charters under the laws of that particular State. The inducements are twofold: Liberality toward home corporations, and the reverse of liberality toward foreign corporations. As an instance of this latter it comes from Alabama that the legislature of that State has passed a law providing that all foreign corporations, excepting railroads, telegraph, long distance telephone, insurance companies and certain banking institutions, shall pay to the State an annual tax equal to one-tenth of 1 per cent. of the actual amount of capital employed in the State, and another tax to the county equal to one-twentieth of 1 per cent. This means that the tax paid by foreign corporations will be twenty times as great as it is to-day, which is a pretty serious item of expense, an item that may very likely figure in the question of dividends. Massachusetts furnishes an equally striking example of the inducement of liberality. Until last summer Massachusetts corporations had to show actual property for every dollar of capital stock authorized, so that there could be no overcapitalization unless the incorporators took a false oath. To-day it is possible in that State to capitalize, say, for \$100,000, by putting in good will, patent rights and the like for \$99,000 and cash \$1000.

The argument is made that a State is better able to safeguard the stockholders of corporations doing business within its boundaries and generally to look out better for the interests of the public if the corporation has the State's charter. This would be very true were it not for the extreme liberality with which the modern corporation charter is attended. The State knows the stockholders, but cannot tax them, because the tax is direct upon the corporation, the stock being exempt, under the general custom. The bars are so let down that commissioners of corporations, or whoever the power may be that looks

after domestic corporations, can do little to restrain corporation officers in the making of their returns and the like. Practically all that a State makes out of over-liberal corporation laws and discrimination against foreign corporations is a greater income from corporation fees, which money, while it may count up into many thousands of dollars, is as nothing compared to the income, direct and indirect, which comes from encouraging all corporations to do business within the State. It is the business done by corporations, the wages paid, the taxes, the reputation, that count. It matters not so much under what laws a corporation is chartered, so long as it employs labor and adds to the general wealth of the commonwealth.

There are many men who would like to see the whole matter of corporation laws studied by a commission made up of strong men, with a view to a general United States law, to take in all States, like the bankruptcy laws and the patent laws and other great general acts which place business on an equal footing no matter where business is done.

Wire Assuming Leadership.

Again has wire shown a disposition to wrest the leadership of the market from pig iron, the traditional barometer of trade. This lissome offspring of a shapeless sire, albeit one of the youngest of a numerous progeny, has distinguished itself several times in recent years. Soaring to empyrean heights in the winter of 1899-1900, it fell with a sickening thud in April, 1900, carrying the rest of the market with it and in one night changing a period of abounding hope and confidence to a time of doubt, despair and gnashing of teeth. In the fall of 1902 it manifested its ability in the other direction, when the United States Steel Corporation suddenly absorbed the Union Steel Company, and wire jumped from the weakest to the strongest in the list of iron and steel products, setting a pace which was quickly followed by its relatives, on the eve of a period of the most extraordinary consumption of iron and steel the world ever saw. And now, when the general tendency of trade appears to be on the down grade, so that merchants and manufacturing consumers have permitted their stocks to shrink to comparative nothingness, wire takes advantage of the bare warehouses and jumps its price. True, the advance is only a slight one, but it is an advance instead of an expected decline, and takes off his feet many a buyer who counts himself shrewd and wary.

Whether the advance in wire products will have much influence on the demand for other iron and steel products remains to be seen, but it undoubtedly comes at a good time to act as a tonic. The wire trade is always of very large volume in the spring, and a higher level of prices established at this time can be more easily maintained than at other seasons, when a shrinkage in consumption is to be expected. The spring demand comes not only from the building trade, important as that is in its consumptive requirements, but from a host of other interests with whom wire has grown to be a necessity. This diversity in the demand for wire really makes it to a considerable extent a better index to the condition of general business than the demand for pig iron. Wire has grown to be an article of universal use. It is found in some shape in nearly every piece of machinery, it has made itself indispensable to the farming interests, it exhibits its usefulness in countless ways in every household, and is so adaptable that the ingenuity of man is constantly finding new ways for its employment. This vigorous industry, which has attained such

great proportions, is comparatively youthful. Although wire had been drawn in this country for many years, its production was limited until about 30 years ago. It was not until Bessemer steel began to be produced on a fairly large scale that the wire era may be said to have really dawned. The day may come when our production of wire will exceed our output of steel rails.

One hears a good deal of superficial talk about the great financial good that will come to the United States if there is war between Russia and Japan. There seems to be a quite general impression that such a war would afford a great outlet for the American products. It is pretty difficult to reason out such a result under existing conditions. In the first place, times have changed. A generation ago, even a decade ago, America had not acquired any considerable market for its manufactured products in the Far East, and would not have to count its loss as compared to the certain results which would come from a demand for the various munitions and supplies of war. The good results would more than offset the evil. But to-day both Japan and Russia would take little actual war material from the United States. Probably Japan would never attempt the blockade of the Russian Baltic coast, so that American goods would still find their way into Russian territory, but at a greater cost of freights. And the people of Russia would be more heavily taxed, doubtless, to pay the expenses of war, and, already poor, would have less money to spend. In the Far East ports would be blockaded. Freight rates would approach the prohibitive. The Japanese markets, where American manufacturers are finding a profitable outlet for their products, would be greatly curtailed. The people would be poorer. The American trade with Siberia and with Korea would be seriously menaced. Perhaps as important as anything in this connection are the possibilities concerning the effect of such a war on the Chinese trade. The cotton industry would feel this. At home a great war, even of short duration, would probably affect the stock market, in sympathy with conditions in European financial centers, and Wall Street has had enough troubles of late without another to reach out its influence over the business life of the nation. If there is to be war, America will best appreciate a very short season of hostilities.

The American Sheet & Tin Plate Company.—A special train arrived in Pittsburgh on Saturday morning, January 9, bearing a large number of officials and clerks of the American Sheet & Tin Plate Company, who are to occupy offices on the thirteenth floor of the Frick Building. These offices are now being put in shape and additional officials and clerks will continue to arrive from New York as fast as arrangements can be made for them. Until April 1 the headquarters of the purchasing and sales departments will continue in the Vandergrift Building, after which they will be removed to the Frick Building. The sales office at Detroit has been abolished, and the Pittsburgh sales office will be merged with the general sales office, which will be in the Frick Building. The American Sheet & Tin Plate Company occupy the entire thirteenth floor of the Frick Building and part of the fourteenth floor.

Germany is seeking a commercial agreement with Canada. Germany, on December 30, notified Great Britain that in view of the announcement that the latter regards tariff arrangements with her colonies as exclusively a matter of domestic politics, Germany would no longer oppose preferential concessions made by the colonies mutually and to Great Britain. Germany, in making the communication, expressed a desire for an arrangement by which her commercial relations with Canada would be assimilated with those of the rest of the British Empire.

Pig Iron Production Sharply Reduced

Coke Iron Stocks Stationary.

As was expected, the productive capacity active during December was exceedingly small, the total output of the coke and anthracite furnaces for that month having dropped to 852,575 tons as compared with 1,039,622 tons in November, and 1,571,126 tons in August. The capacity, which reached 388,000 tons on June 1, 1903, has receded to 187,545 tons on January 1, 1904, so that it was practically cut in two. At the latter date it was probably at its lowest ebb, since a considerable number of the furnaces of the United States Steel Corporation have been started since the opening of the year, with others to follow. The production of the furnace plants of the large steel companies, which reached a maximum in May with 1,037,325 tons was only 406,730 tons in December. On the whole the furnaces outside of the steel companies have suffered less than these. Thus, contrasting July with December, we find that the outside furnaces declined from 558,329 tons to 445,845 tons.

Stocks have increased slightly, the falling off in the South from 285,044 tons on December 1 to 274,355 tons on January 1 having been more than balanced by the quite general increase in the Northern districts.

The following table shows the production in gross tons for the month of December, as compared with the four preceding months, the production of the first six months of the year 1903 having been 9,707,367 tons.

Monthly Pig Iron Production.

	August. (31 days)	September. (30 days)	October. (31 days)	November. (30 days)	December. (31 days)
New York....	39,154	49,664	48,236	43,558	42,200
New Jersey....	19,535	18,263	14,830	12,556	19,324
Schuylkill....	45,759	47,744	38,750	27,520	24,573
Lehigh.....	56,540	45,938	35,862	37,350	37,669
Susq. and Leba- non.....	60,758	49,629	42,988	26,852	8,885
Pittsburgh....	405,595	385,967	357,704	242,640	178,257
Shenango.....	88,484	84,827	81,232	32,929	24,856
West. Penn....	101,678	102,801	102,789	97,397	92,422
Md., Va. and Ky.....	70,874	64,395	71,168	64,509	60,749
Wheeling.....	75,582	81,305	44,413	18,071	3,437
Cent. and No. Ohio.....	110,426	122,077	87,810	52,784	30,289
Mahoning V....	117,217	106,601	94,801	47,344	57,296
Hanging Rock and Hocking Valley.....	31,329	28,437	25,492	20,464	18,244
Ill., Wis., Minn., Mo. and Col.	208,778	201,070	200,062	150,051	96,623
Alabama.....	104,357	133,008	148,527	138,806	129,850
Tennessee, No. Carolina and Georgia....	35,060	34,991	29,992	30,211	28,402
Charcoal pig..	1,571,126	1,553,717	1,425,656	1,039,622	852,575
	42,905	42,986	37,537	39,006	45,805
Totals....	1,614,121	1,596,703	1,462,193	1,078,628	898,380

There were blown out in December or banked on January 1, Genesee in New York, Secaucus in New Jersey, one Saucon in the Lehigh Valley, six Edgar Thomson, two Eliza, one Monongahela in the Pittsburgh district, Mabel, Atlantic and one Shenango in the Shenango Valley, Scottsdale and Everett in Western Pennsylvania, one Pennsylvania Steel in the Lower Susquehanna, one Lebanon in the Lebanon district, La Belle and Belmont in the Wheeling district, Etna in the Hanging Rock region, three Joliet, one North Works, five South Chicago, one Union, and two Bay View in the Chicago district, and Anna in the Mahoning Valley. In the South there were blown out in Virginia, Radford Crane, in Kentucky one Ashland, in Alabama one Pioneer, one Sheffield, one Talladega and one Woodstock. There were started during December one Wharton in New Jersey, one Carrie and one Duquesne in the Pittsburgh district, Rockhill and Rebecca in Western Pennsylvania, one Bellaire in the Wheeling district, Newburgh and Toledo in Ohio. In the South, Graham in Virginia, Alice in Alabama, and Standard in Tennessee were started.

The total capacity of all furnaces in operation has been reduced, as is shown by the following table of the weekly capacity of the furnaces in blast on January 1, compared with preceding monthly periods:

	Total capacity per week. Gross tons.	Coke capacity per week.	Charcoal capacity per week.
January 1, 1904.....	197,931	187,545	10,886
December 1, 1903.....	253,930	244,156	9,774
November 1.....	282,219	273,715	8,504
October 1.....	361,492	353,142	8,350
September 1.....	369,933	360,197	9,736
August 1.....	362,330	353,681	8,649
July 1.....	395,042	384,825	10,217
June 1.....	398,189	388,178	9,961
May 1.....	381,697	373,496	8,201
April 1.....	376,576	368,215	8,361
March 1.....	354,733	347,424	7,309
February 1.....	343,111	335,339	7,772
January 1.....	353,800	346,073	7,727
December 1, 1902.....	343,817	336,617	7,200
November 1.....	337,559	330,110	7,449
October 1.....	345,048	337,837	7,211
September 1.....	335,189	328,243	6,946
August 1.....	336,465	328,745	7,720
July 1.....	310,950	303,793	7,157
June 1.....	344,748	337,492	7,256
May 1.....	352,064	337,627	6,437
April 1.....	337,424	331,140	6,284
March 1.....	323,028	316,039	6,989
February 1.....	332,045	325,440	6,605
January 1.....	298,460	291,992	6,468
December 1, 1901.....	324,761	317,358	7,403

Coke and Anthracite Furnaces in Blast.

Location of furnaces.	Number of stacks.	January 1.		December 1.	
		Number in blast.	Capacity per week.	Number in blast.	Capacity per week.
New York.....	18	7	9,167	8	10,152
New Jersey.....	8	5	4,581	4	3,904
Spiegel.....	3	2	310	1	169
Pennsylvania:					
Lehigh Valley.....	27	13	8,506	14	8,184
Spiegel.....	1	1	100	1	93
Schuylkill Valley.....	13	6	5,550	6	4,850
Lower Susquehanna.....	10	1	1,550	2	3,030
Lebanon Valley.....	12	1	404	2	1,411
Pittsburgh District.....	37	15	41,300	22	60,759
Spiegel.....	2	2	1,550	2	1,534
Shenango Valley.....	19	3	3,850	6	8,163
West Penn.....	18	15	20,700	15	21,911
Spiegel.....	1	1	937	1	815
Maryland.....	5	3	5,453	3	5,718
Wheeling District.....	12	1	2,350	2	2,959
Ohio:					
Mahoning Valley.....	15	7	13,244	8	13,731
Cent. and North.....	16	7	11,892	5	10,309
Hocking Valley.....	2	0	0	0	0
Hanging Rock.....	12	5	2,981	6	4,224
Illinois.....	19	4	8,000	12	25,529
Spiegel.....	2	0	0	2	1,424
Minnesota.....	1	0	0	0	0
Wisconsin.....	5	2	1,074	4	3,300
Missouri.....	1	0	0	0	0
Colorado.....	5	1	0	3	2,427
The South:					
Virginia.....	23	11	6,950	11	7,778
Kentucky.....	8	3	1,477	4	1,961
Alabama.....	41	27	28,146	30	33,850
Tennessee.....	16	11	6,173	11	6,436
Georgia.....	1	1	400	1	435
North Carolina.....	2	0	0	0	0
Totals.....	355	155	187,545	186	244,156

Charcoal Furnaces in Blast.

Location of furnaces.	Number of stacks.	January 1.		December 1.	
		Number in blast.	Capacity per week.	Number in blast.	Capacity per week.
New England.....	5	2	193	2	185
New York.....	3	2	1,322	1	736
Pennsylvania.....	5	2	103	2	120
Maryland.....	1	1	83	1	103
Virginia.....	4	2	107	2	118
Ohio.....	8	4	280	4	260
Tennessee.....	2	1	64	1	54
Georgia.....	5	2	731	2	762
Alabama.....	5	4	1,152	4	1,254
Michigan, Missouri and Wisconsin.....	14	10	6,101	10	5,725
Texas.....	1	1	250	1	257
Totals.....	53	31	10,386	30	9,574

Production of Steel Companies.—Returns from all the plants of the United States Steel Corporation, the Cambria, Pennsylvania, Maryland, Lackawanna, Wheeling, Ashland, Republic, Jones & Laughlin, Clairton, La Belle, Bethlehem and Colorado companies show a total product of 406,730 tons for December, as compared with 553,067 tons for November, 829,215 tons for October, 956,363 tons for September, 993,564 tons in August, 987,855 tons in July, 1,021,839 tons in June, 1,037,325 tons in May and 966,850 tons in April.

Production of Spiegeleisen.—The production of spiegeleisen and ferromanganese was 15,394 tons in December, as compared with 17,695 tons in November, 10,374 tons in October, 8406 tons in September, 15,862 tons in August, 14,933 tons in July, 16,309 tons in June, 17,600 tons in May and 17,555 tons in April.

Stocks.

The position of furnace stocks sold and unsold, as reported to us, was as below on January 1, as compared with the preceding months, the same furnaces being represented as in former months. This does not include the holdings of the steel works producing their own iron:

	Stocks, August 1.	Sept. 1.	Oct. 1.	Nov. 1.	Dec. 1.	Jan. 1.
Anthracite	311,174	356,701	450,193	539,810	593,239	597,954
Charcoal.....	31,289	45,305	56,245	57,589	60,922	90,711
Totals.....	342,463	402,006	506,438	597,399	663,161	688,615

MANUFACTURING.

Iron and Steel.

Creditors of the Jackson Iron & Tin Plate Company, Clarksburg, W. Va., have petitioned Judge Jackson to declare the company bankrupt. The plant is an eight-mill concern and cost over \$500,000. It has been closed several months by court proceedings.

During the idleness of the Tod Furnace of the Youngstown Steel Company, Youngstown, Ohio, recently blown out, the stack is being remodeled. Chief among the improvements is a new top and installation of a complete charging device, including new skip bridge with automatic charging buckets. Other changes embrace new blast piping and construction. The work is being done by the William B. Pollock Company of Youngstown, Ohio, blast furnace builders and erectors of steel plate construction.

The plant of the Chicago Steel Mfg. Company, Hammond, Ind., was badly damaged by fire December 30. This company operated their own rolling mill and were large producers of cut nails, harrow disks, steel fence posts and of some horseshoes. The machinery for the manufacture of these products was almost entirely destroyed. Their largest engine and one battery of boilers were greatly injured. The total loss will be between \$130,000 and \$140,000, on which \$84,700 insurance was carried. It is the purpose of the company to rebuild immediately, and meanwhile they have made arrangements to take care of their cut nail trade without interruption. The output of nails of this plant in 1903 was stated to be 150,000 kegs, together with 6000 tons of high carbon plates. Their machinery for making harrow and cultivator disks had only been installed a few months.

Another step was taken toward completing the consolidation of the Whitaker Iron Company, Wheeling Corrugating Company, Wheeling, W. Va.; Laughlin Nail Company, Martin's Ferry, Ohio, and Portsmouth Steel Company, Portsmouth, Ohio, on December 28, when a charter was issued to the Whitaker-Glessner Company with a capital stock of \$3,000,000. The incorporators are N. E. Whitaker, W. L. Glessner, Alexander Glass, W. L. Rice and A. C. Whitaker.

The Keystone blast furnace of the Reading Iron Company, at Reading, Pa., which has been out of service for repairs, will be put in blast some time in March.

Notices have been posted at the mills of the Lalance & Grosjean Mfg. Company, Harrisburg, Pa., that the local plants will not resume operations until February 1, and that on that date a readjustment of wages will be made. These mills have enjoyed unusual prosperity during the dull season in the iron trade, and this is their first shut down.

The Pennsylvania Steel Company have put in blast their No. 1 furnace, at Lebanon, Pa. Two of the blast furnaces at Steelton, Pa., are now producing, and the company will shortly blow in two more and another at Lochiel, which is now being prepared for operation. The Lebanon furnace had been banked for more than a month.

Eighty-five rush orders, some of which are for April delivery, have been booked by the Middletown plant of the National Tube Company, at Middletown, Pa., and the mills which are now being repaired are being put in readiness for operation at an early date. The mills will resume with a reduction of wages.

The Ellwood Ivins Tube Works, Oak Lane Station, Philadelphia, report large orders for their new product in seamless tool steel tubes. The manufacture of these tubes is a distinct achievement. They are finished in a bright polish and are true and accurate to size, both inside and outside. Many of these tubes are used for rock drills, punches, dies and other purposes where tool steel has heretofore been bored to form a tube.

No. 1 blast furnace of the Carnegie Steel Company, at South Sharon, Pa., has been put in blast. The blooming mill at the open hearth plant at South Sharon will be started about January 15 and the rod and wire mills shortly after.

Furnace No. 2 of the Carnegie Steel Company, at Youngstown, Ohio, was put in operation last week after being idle about two months. During the time the stack was out it was relined and repaired. Stack No. 3 at this plant, which is being relined and repaired, will be ready for blast early in March, and No. 4, which is the new stack, is expected to be ready for blast early in April.

The puddling and 8-inch mills at the Greenville works of the Carnegie Steel Company, at Greenville, Pa., have been started.

The Braddock works of the American Steel & Wire Company, at Braddock, Pa., resumed operations on Monday, January 11, in all departments. This plant has been closed down for about six weeks, during which time it has been remodeled to some extent, and a large amount of new machinery added and other improvements made.

The Chester works, at Chester, W. Va., and the Laughlin works, at Martin's Ferry, Ohio, of the American Sheet & Tin Plate Company have resumed operations. At both of these plants reductions in wages have been made.

The Herrick Company, incorporated under Massachusetts laws, with a paid in capital of \$100,000, have succeeded Holder & Herrick, 47-49 Broad street, Boston, Mass., who commenced business January, 1877. George W. Herrick of the former firm is president of the new corporation, who will continue the business of importers and dealers in tin plate, sheet iron and metals at the old location. They are also agents for Taunton & New Bedford Copper Company, makers of sheet copper.

On Monday, January 11, the South Sharon Works of the American Tin Plate Company started up; also the rod mill in the South Sharon Works of the Carnegie Steel Company, and the wire and wire nail mills in the same plant, which are operated by American Steel & Wire Company, are to start this week. The open hearth plant at the South Sharon Works, operated by Carnegie Steel Company, will also start this week.

The open hearth plant of the Carnegie Steel Company, at New Castle, Pa., known as the Shenango Works, and which has been idle for some time, is expected to start up on Monday, December 18. Rosena furnace, at New Castle, also owned by the Carnegie Steel Company, has blown in and McKinley furnace is expected to start up this week.

General Machinery.

The Fillon Machine Company, one of the oldest iron manufacturing concerns of Dallas, Texas, have been forced into bankruptcy in the Federal Court by creditors. The liabilities will reach close to \$100,000. Assets nominally \$110,000, practically much less.

The William Tod Company, engineers, founders and machinists, of Youngstown, Ohio, have put part of their plant on double turn in order to get out certain work which is in a rush.

The Pennsylvania Railroad expect to add only 100 locomotives to their equipment during the present year, as against 500 in 1903. Half of the order will be placed with the Baldwin Locomotive Works, Philadelphia, and the other 50 will be built at the company's shops, at Altoona, Pa.

Before very long considerable equipment will be required by the Fore River Ship & Engine Company, Quincy, Mass., who are preparing plans for an extension to their forge and annealing plant. They are not yet ready to purchase the additional machinery.

The S. A. Woods Machine Company, South Boston, Mass., manufacturers of wood working machinery, are specializing their lines, with the intention of dropping certain of the machines formerly built by them and concentrating their energies on planers and matchers, molding machines and other machines of less importance. They are an old concern, having been in business for 50 years, and the specialization is in reality returning to their original lines, brought strictly up to date.

The Badger Machinery Company, Milwaukee, Wis., have incorporated to do a general jobbing business in power transmission appliances. The company are permanently located at 140 West Water street, where they will carry a complete stock of pulleys, hangers, boxes, shafting, chain, elevator material, rubber and leather belting, &c. L. Kurtz, for ten years connected with the B. Uhrig Fuel Company, is president and treasurer; D. M. Guilbert, for many years superintendent of construction of the power transmission department of the Milwaukee-Rice Machinery Company, is vice-president, and C. A. Schuman, also with the latter company for a number of years, is secretary.

The Heald Machine Company, Worcester, Mass., report an excellent condition of business. They have been shipping a lot of drill grinders to Charles Churchill & Co. of London, and Fenwick Frères & Co. of Paris, and one to Japan for the Nippon Railway Company. Among the domestic orders are grinders for the Government, including several for Watervliet Arsenal, at Troy, N. Y., and the Frankford Arsenal, at Philadelphia.

Peterson, Seburn & Co., riggers and structural iron erectors, of Pittsburgh, have recently closed a number of contracts, among which are the erection of four ore unloaders at the Central furnaces of the American Steel & Wire Company, Cleveland, Ohio. These are said to be the largest ore unloaders on the lakes and were designed by Hoover & Mason of Chicago. The material is being made by the Variety Iron Works, Cleveland, Ohio. Peterson, Seburn & Co. are erecting 11 large traveling cranes for the Ridgway Machine Tool Company, at Ridgway, Pa., ranging in capacity from 5 to 40 tons. These cranes are made by the Niles-Bement-Pond Company.

Considerable machinery will be required by the Morning Star Mfg. Company, Napoleon, Ohio, who inform us that they will rebuild at once their threshing machine plant, which was recently destroyed by fire, and equip it with a line of iron and wood working machinery. A 40 horse-power engine and probably a 60 horse-power boiler will be installed.

A new ice manufacturing company at Kenton, Ohio, headed by W. P. Bowman, of that place, have placed contracts with the York Mfg. Company of York, Pa., for the plans for the buildings, together with the machinery required. The plant is to be completed by April 1.

The Osborn Engineering Company, Cleveland, Ohio, are preparing plans for a plant for the National Carbon Company of Cleveland, to be erected at Clarksburg, W. Va. They are

also figuring on another factory for the Warner & Swasey Company of Cleveland, manufacturers of machine tools. The latter company have recently completed a large addition.

The Warren Sheet Metal Company, Warren, Ohio, are preparing to double the equipment of their galvanizing plant, and expect soon to add presses and other machinery for the production of several new lines of specialties. For this purpose the company have increased their capital stock from \$50,000 to \$75,000.

The Cumberland Engineering Company, Cleveland, Ohio, have been incorporated with \$25,000 capital stock, to do a mechanical and electrical engineering business. Incorporators: W. H. Pelton, A. R. Thompson, Ely Shoemaker, E. L. Dulz and N. B. Daerr.

The Ohio Ceramic Engineering Company, Cleveland, Ohio, have purchased a three-acre site on the Lake Shore & Michigan Southern Railway, just west of Cleveland, and are having plans prepared for a large plant for the production of machinery for the making of fancy tile and brick and ceramic goods generally. Their present plant in the down town section of Cleveland is too small for their requirements.

The Interstate Engineering Company, Cleveland, Ohio, who are erecting a large plant at Schneidersville, near Bedford, 12 miles from Cleveland, have commenced work on a large machine shop. The building is to be 185 x 300 feet, and will be concrete and steel construction.

Power Plant Equipment.

Dravo, Doyle & Co., Lewis Block, Pittsburgh, have been appointed general agents in Pittsburgh and Cleveland districts for the Robb-Mumford Boiler Company's type of internally fired boilers.

The Water and Light Commissioners of Oil City, Pa., will receive bids until February 15 for a triple expansion condensing crank and fly wheel pumping engine of 3,000,000 gallons capacity.

R. Munroe & Sons Mfg. Corporation, Pittsburgh, Pa., boiler makers and engine builders, who recently incorporated with a paid in capital of \$300,000, have within the past year added considerable new machinery to their plant and increased the output about 20 per cent. Since the first of the year the company have booked some very nice orders, which will keep them busy for at least six or eight weeks. R. Munroe is president; R. Munroe, Jr., vice-president and general manager; J. D. Munroe, secretary and treasurer.

The power plant of the Pike's Peak Hydro-Electric Company, which is being erected at Manitou, Col., at a cost of \$1,000,000, is nearing completion and will be placed in operation within a month or six weeks.

The Ely Realty Company, Elyria, Ohio, who operate a power plant in that city, supplying light and power to a number of manufacturing plants, as well as private citizens, will about double the capacity of their plant in the near future. They have placed contracts with the Westinghouse companies for a 300 horse-power double acting tandem gas engine, direct connected to a generator. A rotary converter will also be installed. The gas engine will be operated with natural gas, but arrangements will be made to supply artificial gas if necessary. The company will make a bid for the city lighting business.

The Mansfield Engineering Company, Mansfield, Ohio, are building three 200 horse-power engines, which will be utilized in driving some of the electrical equipment at the Louisiana Purchase Exposition at St. Louis.

The Sandusky Water Works Department, Sandusky, Ohio, are replacing a portion of their pumping engine equipment with a new pump supplied by the Holly Mfg. Company. The Board of Public Service of Elyria, Ohio, are in need of additional equipment for their water works and have made a proposition to buy the old Sandusky equipment, but thus far they have been unable to come to terms.

The Lorain & Southern Electric Railway Company, North Amherst, Ohio, have been organized by interests allied with those controlling several large stone quarries at North Amherst, and it is proposed to build a 15-mile electric railway from Lorain to Oberlin through North Amherst. Electric locomotives will be used for hauling stone and freight trains, and the road will be equipped for passenger service as well. It will enjoy a heavy summer traffic to the summer resorts on the Lake Shore near Lorain. It is understood that the company will close contracts with the Westinghouse Electric & Mfg. Company for electric locomotives and electrical equipment for power house and cars.

Foundries.

The recent fire at James W. Carr's foundry, at Richmond, Va., did not do as much damage to the plant as was reported. None of the equipment was damaged to any extent, the loss being entirely confined to the building and fixtures. Repairs are now being made, and within a very short time the plant will be in full operation. In the meantime arrangements have been made to take care of all orders.

The United States Cast Iron Pipe & Foundry Company, New York, are to spend a considerable sum of money in enlarging

the capacities of several of their plants, to take care of their increased business. At their plant at Anniston, Ala., additions are to be erected, a new pit house built and a number of other improvements made, including the installation of new boilers and engines, a dynamo and other equipment. Additional capacity is also to be added to their Buffalo plant, and a large sum of money is to be expended at Addyston, Ohio, in appliances to cheapen the output.

The Gibson Iron Works, Edward Gibson, proprietor, Jersey City, N. J., have incorporated as the Gibson Iron Works Company. The company do a general foundry business and make a specialty of grates. They have a large sale for their patent Common Sense dumping grate, of which some 8000 square feet are used by the New York Edison Company, 2400 square feet by the Brooklyn Rapid Transit Company, and of which the new Interborough Railroad will have 3600 square feet at their new power house, at Fifty-ninth street and Eleventh avenue, New York. The officers are: Edward Gibson, president and treasurer; Ralph Conrad, secretary, and Harry J. J. Johnson, superintendent of construction.

J. L. Williams, who was for 15 years manager at the Union Foundry Works, Catasauqua, Pa., has leased the brass department of the Crane Iron Foundry in that city and will manufacture under the name of the Hercules Metal Works. Castings of all descriptions in brass, copper and bronze will be made, special attention being given to the requirements of blast furnaces, rolling mills and coal mining machinery and supplies.

Some little equipment is required by the Pequonock Foundry, Bridgeport, Conn., to replace that lost in the recent fire which destroyed their office, grinding and pattern storage departments.

The recently incorporated Standard Foundry Company, Hartford, Conn., have taken over the plant and foundry occupied by the Carleton Foundry Company, and will do a general foundry business. The plant is thoroughly equipped, and it is not likely that any new machinery will be purchased at present. Albert C. Bill is president.

The Norwich Iron Foundry, A. H. Vaughn & Sons, proprietors, Norwich, Conn., have incorporated as the Vaughn Foundry Company. No additions to plant or changes in management are contemplated.

The Charleston Foundry Company, Mattoon, Ill., began operations in their new plant December 16, the buildings of which are of brick construction and are the following: Molding shop, 80 x 200 feet; cupola house, 30 x 40 feet; mounting shop, 50 x 250 feet; mill room, 20 x 80 feet; japan room, 20 x 25 feet; polishing room, 22 x 40 feet; heating and power building, 45 x 60 feet; warehouse, 50 x 200 feet; pattern storehouse, two stories, 30 x 50 feet; sand house, 20 x 40 feet. Electric power is used throughout the plant.

The Washington Pipe & Foundry Company, Tacoma, Wash., have purchased for \$25,000 the plant of the Deming-Berry Pulley Company. The plant will be equipped with modern machinery and put in operation by January 15.

The Lancaster Malleable Iron Works, Lancaster, Pa., whose annealing and tumbling rooms and stock sheds were recently destroyed by fire, have made temporary repairs which enabled them to start up ten days after the fire. They are now placing contracts for new buildings, which will be on a larger and better scale, and practically fire proof. The boilers and engines were not seriously injured.

The foundry of the Craig Shipbuilding Company at Toledo, Ohio, has just turned out a casting for a low pressure cylinder for the engine of a large side wheel lake steamer being built by them for the Graham & Morton Transportation Company. The cylinder casting was the largest of its kind ever produced in Toledo, and weighed 23 tons. It will be finished in the new Craig machine shop.

The Bad Axe Foundry Company, Bad Axe, Mich., have elected William Mutart, president, and James W. Willey, secretary and treasurer.

Bridges and Buildings.

A contract has been awarded to the Lafayette Engineering Company, Lafayette, Ind., for the building of the superstructure of the Colfax avenue bridge, at Mishawaka, Ind., at a cost of \$59,200, and to the Savage Construction Company of Chicago for the building of the substructure at a cost of \$23,924.40. The bridge will be a plate girder structure, consisting of nine spans, making a total length of about 650 feet. The main roadway will be 30 feet in width, constructed of four lines of girders, two 10-foot sidewalks being supported on either side by brackets. The floor consists of concrete and asphalt, not supported by joist, the concrete being reinforced with corrugated steel bars. The bridge is the first of its character to be built in Indiana and was designed by City Engineer Hammond of Mishawaka.

The Vincennes Bridge Company, Vincennes, Ind., have secured the contract for building a 110-foot bridge at Urbana, Ill.

Fires.

The six-story building at Fifth and Oxford streets, Philadelphia, Pa., occupied by James H. Dillington & Co., manu-

facturers of bobbins and shuttles, was destroyed by fire January 7. The loss is placed at \$50,000.

The machine shop of J. W. Anthoine, Fort Valley, Ga., was recently damaged \$10,000 by fire.

The tippie and coal washer just erected by the Sloss-Sheffield Steel & Iron Company, at Blossburg, Ala., was burned last week, entailing a loss of \$30,000.

The boiler repair shops of the Baltimore & Ohio Railroad at Lorain, Ohio, were damaged by fire on January 9. All machinery was destroyed. The loss was about \$5000. About two weeks ago the main shops of the same plant were similarly destroyed. It is thought that a new plant will be erected at Elyria.

Iron and Industrial Stocks.

The action of the directors of the United States Steel Corporation on January 5 in passing the dividend on the common stock caused the price of that stock to recede to 9% on January 6, which was the lowest price on record; the preferred stock declined at the same time, but not seriously. The market improved later in the week, the common stock advancing to 10% and the preferred to 57½. The new 5's, which had declined sympathetically to 68%, advanced to 71. Other industrial stocks were steady during the entire week, the fluctuations in any case rarely reaching more than one point. The general market, however, was influenced by the possibility of war between Russia and Japan, which naturally checked transactions. Last prices on active stocks up to 1.30 on Wednesday were as follows: Car & Foundry, common, 18½; preferred, 67½; Locomotive, common, 18; preferred, 77; Colorado, 29½; Pressed Steel, common, 27; preferred, 69; Railway Spring, common, 22¼; preferred, 76; Republic, common, 6%; preferred, 42; Sloss-Sheffield, common, 31½; preferred, 79; Tennessee, 37; Steel, common, 10½; preferred, 57½; new 5's, 71.

Net earnings of the Cambria Steel Company last year are said to have been about \$2,750,000, or more than double the amount required for the annual dividend of 3 per cent. on \$45,000,000 capitalization.

Now that the Pressed Steel Car Company of Pittsburgh have closed their fiscal year some interest is being manifested in dividend matters as regards the common stock. The surplus earnings during 1903 amounted to about \$1,600,000. This could be paid in dividends on the common stock should the directors deem it advisable. All of the surplus is intact, for the dividends paid on the common stock during 1903 were of the surplus earnings of 1902. While the surplus earnings for 1903 are in excess of 12 per cent. on the common stock, nothing definite has been decided as to what the policy of the company will be during 1904 regarding dividends on the common stock. It can be said that the dividend policy of the directors will be governed somewhat by the amount of business that the company have on their books when the matter is considered several weeks hence. Should orders in hand be small, with the outlook uncertain, it is probable that the directors will follow a conservative course in the matter and pass the dividend on the common stock.

Dividends.—Rogers Locomotive Works have declared the regular quarterly dividend of 1½ per cent. on the preferred stock, payable February 1.

Tennessee Coal, Iron & Railroad Company have declared the regular quarterly dividend of 2 per cent. on the preferred stock, payable February 1.

The Harbison-Walker Refractories Company of Pittsburgh have declared the regular quarterly dividend of 1½ per cent. on the preferred stock, payable January 20.

The regular quarterly dividend of 1½ per cent. on the preferred stock of the International Steam Pump Company will be paid February 1.

American Car & Foundry Company have declared the regular quarterly dividend of 1¼ per cent. on preferred and a dividend of 1 per cent. on common for the six months to the end of April 30 next, payable in two quarterly instalments of ½ per cent. each. The dividend on the common is a reduction of 1 per cent. from the amount paid in the previous fiscal half year. The preferred dividend and the first instalment of ½ per cent. on the common stock are both payable February 1. The next dividend payment will be made on May 1.

A meeting of a number of the makers of light rails will be held in Pittsburgh on Thursday, January 14, for the purpose of taking up and discussing the present situation in the light rail trade. For some time light rails have been selling at very low prices, in many cases less than is charged for standard sections, and it is the object of this meeting to endeavor to put the light rail trade on a better basis. It is said that some of the leading mills, including Carnegie Steel Company, Cambria Steel Company, Pennsylvania Steel Company and others, will not be represented.

Improvements Past and Prospective.

The following reports from correspondents in the West indicate the general condition of business. It is a noteworthy fact that nearly all interests report the trade for 1903 from 20 to 30 per cent. greater than in 1902. It will also be seen that there has been a widespread enlargement of plants and increasing of output. That this process of improvement was not checked altogether by the depression of the closing months of 1903 is shown by the many prospective improvements and enlargements named in the items below:

Iron and Steel.

The Republic Iron & Steel Company during 1903 installed at their Brown-Bonnell Works, Youngstown, Ohio, 7, 8 and 10 inch Morgan continuous mills; increased the capacity of their Bessemer steel plant at the same place from 1000 to 1500 tons of steel billets per day; installed at their Sylvan Works, Moline, Ill., an 8-inch Morgan continuous mill and increased the capacity of their Nos. 1 and 2 blast furnaces at Thomas, Ala., from 150 to 225 tons per day.

The New Process Steel & Wire Company, East St. Louis, Ill., report general trade conditions in their line for 1903 as being good.

The Crawfordsville Wire & Nail Company, Crawfordsville, Ind., have increased their capacity for producing woven field fencing, spring wire, telephone wire and galvanized fence wire, and have installed a complete new equipment for galvanizing fence wire and telephone wire. Sales for 1903 aggregated 10,000 tons, which was an increase of 2500 tons over the tonnage of 1902.

The Seamless Steel Tube Company, Detroit, Mich., state that they produced during the year 1903 approximately 30,000 tons of seamless steel tubes, applying in Government, marine, stationary, mechanical and locomotive service.

The Vulcan Iron Works, Seattle, Wash., have been working on plans for some time for the erection of a rolling mill, which they now expect to have under way at an early day after the first of the year. During the past year they added to their equipment several large machines, including punches, shears, bolt and nut machines, lathes, &c. Their greatest business at present is in iron and steel and general supplies, which are now supplied from two stores in Seattle and one at Aberdeen, Wash., and the company are now preparing to open two additional branches—one at Tacoma, Wash., and the other at Whatcom, Wash.

Forges.

The Block-Pollak Iron Company, Cincinnati, Ohio, have during the past year about trebled their capacity for the making of steel and iron forgings for marine and machine builders. They have installed several shape hammers, the largest of which will take in shafts up to 45 inches in diameter and 40 tons in weight. They have erected a new machine shop, equipping it with electric traveling cranes, new lathes, planers, boring mills, slotters, &c., and have also built a steel forge shop, 100 x 400 feet. They have also doubled the capacity of their axle department for making open hearth steel axles and iron axles. With the increased capacity the company's output for the year 1903 was almost three times that of any previous year.

The Vulcanus Forging Company, Cleveland, Ohio, are remodeling their plant, changing the product from the general line of forgings, bolts, upset rods, &c., to rivets and air brake pins exclusively. They have disposed of all their heading machines, hammers, bulldozers, &c., in order to make the necessary changes. They have added about 8000 square feet of new building, installed an electric trolley for distribution of the material from the cars, remodeled their steam plant, and are installing conveyors for all their machines. The company expect to have the improvements completed by the latter part of January.

The Detroit Forging Company, Detroit, Mich., whose plant was partially destroyed by fire in August of last year, have rebuilt their works, enlarging them 33 1-3 per cent. Their output for 1903 exceeded that of any previous year by 30 per cent.

The Chicago Drop Forge & Foundry Company, Kensington, Ill., report the volume of output for 1903 greater than for any year for the past five years. General trade conditions are healthy at the present time, but show evidence of a depression. The company believe that a conservative policy is wise, and that while there is a considerable inquiry purchasers do not expect to buy except for immediate wants, anticipating lower prices.

Arthur J. O'Leary & Son Company, Chicago, are erecting a four-story factory, 60 x 142 feet. Their output for the year was 33 1-3 per cent. greater than that of 1902. They have found trade light for the last two or three months, but improving in December.

Structural Work.

The Champion Iron Company, Kenton, Ohio, have replaced their old plant, which was destroyed by fire in 1902, with a new modern plant of brick and steel construction. The buildings comprise a main shop, 110 x 300 feet, with galleries on either

side 30 x 300 feet; a foundry, 100 x 180 feet; a pattern building, adjoining and connected with the foundry, 40 x 100 feet, three stories high; a power plant, 43 x 80 feet, one story high; a blacksmith shop, 40 x 80 feet; a storage room for plates, 30 x 90 feet; a stock building for rivets, bolts and malleables, 24 x 120 feet, and various small buildings, such as sand shed, building for cleaning castings, furnace building for heating and tempering, &c. In addition to these there is an office building, two stories and basement, having all modern conveniences, and during the coming spring a superintendent's office and storeroom will be built. Business for the year 1903 was the largest in the company's history, and they report the outlook good for continued prosperity in their line.

The Rogers Iron Company, Springfield, Ohio, making a general line of structural and ornamental iron work as well as special machinery, have under construction an extension to the main building of their plant, which will give about 30 per cent. increase in floor space. This spring the company expect to erect a new foundry building. Business during the past year has been the best in the history of the company, and the outlook is good for 1904.

The Forest City Steel & Iron Company, manufacturers of steel buildings and bridges, ornamental iron and wire work, Cleveland, Ohio, during the past year built a complete new plant at the head of Dartmouth street, on the Lake Shore & Michigan Southern Railway, about one mile west of the old plant. New machinery of the latest design, both for fabricating and handling structural steel, has been added. The capacity of the new plant will approximate 12,000 tons, which is 8000 tons greater than the output for 1903 at the old plant. The company report that trade conditions are quiet, but that there are some evidences of a better tone in the near future.

The Decatur Bridge Company, Decatur, Ill., completed during 1903 the entire new plant which they now occupy, consisting of a main building, 70 x 176 feet, of brick construction with metal covering; a blacksmith shop, 48 x 64 feet, of brick with composition roof; a power house, 25 x 55 feet, of brick with composition roof. The company generate their own electricity, running their entire plant with electric power. During the early part of 1904 a pattern shop and storehouse will be erected, and in addition to the construction of these two buildings about \$1200 worth of machinery equipment will be purchased. The company also expect to increase their capital stock from \$30,000 to \$50,000. They anticipate a fairly good trade during 1904.

The Vincennes Bridge Company, Vincennes, Ind., have increased their capital stock from \$20,000 to \$30,000. They expect to enlarge their plant in the spring by the construction of a concrete building having a floor space of 20,000 square feet. Their tonnage for 1903 shows an increase of 600 tons over 1902, being 1800 tons. They report prospects in their line as being good for 1904.

The New Castle Bridge Company, Indianapolis, Ind., have installed one of the Springfield low pressure process oil plants with a storage tank of two cars capacity. They have also placed in their works one of the Long & Allstatter angle shears, capable of taking care of the largest angles. A few minor installations have been made of small tools, such as reamers, riveting hammers, &c. The capitalization of this company is now \$150,000, it having been doubled early last year. If business is of sufficient volume this year further additions in machinery equipment may be made. A tonnage double that of 1902 was experienced during the year 1903.

The Clinton Bridge & Iron Works, Clinton, Iowa, expect to make some improvements this year, but these have not yet been completely arranged for. The company look forward to a business equally as good in 1904 as was experienced in 1903, which was in excess of that of the previous year.

The Topeka Bridge & Iron Works, Topeka, Kan., experiencing an excellent trade, expect to double their facilities during the coming year.

The Portland Bridge & Building Company, Portland, Ore., have secured contracts for the construction of two steel viaducts—one for the Portland Railway Company, requiring 240 tons of steel, and the other for the city of Portland, requiring about 280 tons.

The Canton Bridge Company, Canton, Ohio, expended about \$40,000 in the way of improvements last year, giving them double their previous capacity. Their total tonnage for the past year was 6000 tons, showing a gain of 1500 tons over 1902. Future prospects are bright, promising to give employment to the full capacity of their plant.

The Winamac Bridge Company, Winamac, Ind., will move early this year into the brick building formerly occupied by the Great Western Canning Company. The building is 90 x 120 feet, with a wing 39 x 90 feet. At the same time they will recapitalize at \$35,000. About \$5000 will be expended for new machinery for the new quarters in the shape of air compressor, and riveter, bending rolls, structural punch, &c. Business for the past year was double that of 1902, and the new year has begun with plenty of work.

The Wisconsin Bridge & Iron Company, North Milwaukee, Wis., report an approximate output in 1903 valued at \$1,250,000. The company built a new engine house, as well as installing a

number of heavy and improved machines in their plant. While the railroads are not buying heavily of bridge material at the present time, a general revival is expected after the first of the year. They have a fair amount of work on hand and expect no difficulty in keeping their establishment busy during the year 1904.

The Noelke-Richards Iron Works, successors to Haugh-Noelke Iron Works and the Indiana Ornamental Iron Works, Indianapolis, Ind., increased their capital stock in 1903 from \$50,000 to \$175,000. Buildings to the value of \$40,000 were erected and \$35,000 worth of machinery installed. The buildings include a steel addition to their fitting department, 80 x 120 feet; a cleaning shop containing about 6000 square feet, and a pattern shop of about the same dimensions. An old shop, 50 x 150 feet, was turned over to the exclusive use of the ornamental iron department. Among the machines installed were two high speed electric traveling cranes, of a span of 80 feet, one of them for service on a 500-foot track in the yard, the other for use in the fitting shop. Several punching and shearing machines, scissor riveters, pneumatic chipping and reaming tools and a Johns patent beam shear were added. Their approximate output of the past year was about 7000 tons of structural material and from \$150,000 to \$200,000 worth of ornamental iron work, the whole being an increase of about one-half over 1902. Trade conditions have been quiet for the past four months, but a good year is expected in 1904.

The Oregonia Bridge Company, formerly a copartnership, Lebanon, Ohio, were in June, 1903, incorporated under the laws of Delaware with a capitalization of \$50,000. Since then the company have erected a large new bridge factory at Lebanon, equipped with all modern machinery and having a capacity of 2500 tons. Business is still being conducted at the old plant, but the company expect to be in their new quarters in a very short time. Their approximate output for 1903 was one-third greater than in 1902. The officers of the company are: John Bradbury, president; Charles A. Spencer, vice-president; Thomas R. Spencer, treasurer, and Howard W. Ivins, secretary.

The Paxton & Vierling Iron Works, manufacturers of structural and ornamental iron and steel, Omaha, Neb., have made a number of important improvements during the past year in different departments of their plant, such as the installation of steel derricks, generator and a number of large and small motors. Further installations of labor saving machinery are planned for 1904, but details have not been decided upon as yet. Business during the past year was not up to the year previous, owing to labor difficulties.

The Joliet Bridge & Iron Company, Joliet, Ill., made some additions to their machine shop during the past year and installed some machinery. An increase in capital stock was made from \$160,000 to \$250,000. Their output for 1903 was about 5000 tons, an increase of 25 per cent. over 1902. Some improvements to their plant are contemplated for 1904, but plans are not fully matured. A satisfactory trade is being experienced at present, but an increased demand is looked for with the opening of spring.

The Interstate Engineering Company, Cleveland, Ohio, began the erection of their plant last February, and have since completed the construction of about two-thirds of the buildings contemplated. Their main structural shop, which will be 180 feet clear span, they expect to finish in early spring, the steel work being in place at the present time.

The Industrial Iron Works, builders of steel structures and manufacturers of gas engines, Clinton, Mo., contemplate doubling the capacity of their plant this year. They did as much business in 1903 as in any two previous years, and think that 1904 will even outdo 1903.

The Banner Iron Works, structural iron workers, St. Louis, Mo., made an addition to their shop the past year, 50 x 50 feet and 25 feet high. In 1904 they will build an addition to their foundry, 50 x 60 feet and 25 feet high. New equipment to be installed will include a yard crane with 50-foot radius and an air compressor and riveter. Their approximate business for 1903 in value was \$150,000 as compared with \$120,000 in 1902.

Engines, Boilers and Pumps.

The Vilter Mfg. Company, Milwaukee, Wis., report the years 1902 and 1903 about equal in the amount of business transacted, with prospects good for 1904, as they have been successful in securing contracts for Corliss engines and ice machines for delivery the early part of the new year.

Fuller & Johnson Mfg. Company, Madison, Wis., report that trade just at the present time is rather quiet, but this is their usual dull season, and they expect a fairly good business during 1904.

The Nordberg Mfg. Company, Milwaukee, Wis., say that their output for the year 1903 is larger than that of 1902 by 25 per cent. In their opinion the output of 1904 will about equal that of 1903. During the last four months orders have been few and far between. At present indications are that quite a reaction has set in, and that people are now ready to place orders that have been deferred since June 1.

The Witte Iron Works Company, Kansas City, Mo., report that their business increased from January 1 until about September 1, as compared with other years, but since that time

there has been a gradual let up, and while their outlook for the new year is good, they expect to have to meet a reduction in prices to meet the increasing competition.

The Quincy Engine Works, Quincy, Ill., report business during the past year as having been satisfactory, considering some of the conditions which have existed.

The Girard Boiler & Mfg. Company, Girard, Ohio, made improvements to their plant during 1903 consisting of new boiler and engine house; also the installation of a complete power plant, consisting of two return tubular boilers 72 inches diameter and 18 feet long; a 150 horse-power Corliss engine, a 55-kw. generator and a 15-ton electric traveling crane. Their approximate output for the year just closed was about 550 tons, as compared with 700 tons for 1902. Trade conditions in their line, which consists of blast furnace construction and general light and heavy plate work, have been rather quiet for the past two months, and the placing of much new work is not looked for until spring, many contracts being held back in expectation of a fall in price of material.

The S. Freeman & Sons Mfg. Company, Racine, Wis., added to their plant in 1903 an addition to their boiler shop, of brick and steel construction, 100 feet long by 110 feet wide. Proposed improvements in 1904 comprise the construction of a new boiler house and the installation of a new 300 horse-power internally fired boiler to replace two horizontal tubular boilers now in use. Installations may also be made of an electric crane and of a set of power rolls. The value of the company's output for the year is placed at \$700,000, or an increase of nearly \$100,000 over last year. They find trade conditions in the agricultural implement line at present good, but in the boiler line business at the close of the year was slack, although the prospects are favorable for a good boiler trade in 1904.

The Cedar Rapids Pump Company, Cedar Rapids, Iowa, report that during the first half of 1903 their output was considerably under that of the corresponding period of the previous year, but the last six months of the year have shown a marked improvement over 1902 business. The volume of business in the aggregate for the year is below that of 1902. Wet weather during the last two years has seriously handicapped trade in this line, and upon weather conditions depends the business for 1904.

The Enterprise Boiler Company, Youngstown, Ohio, have made extensive improvements during the past few months in reconstructing their shops, which were badly damaged by fire in August last, changing the drive from belt to electrical individual drive, placing motors on all shop tools, and generally remodeling throughout. The completed changes have given them 20 per cent. more floor space. Their output for the year was about 3000 tons. They report the outlook for future business bright.

The Aetna Foundry & Machine Company, Springfield, Ill., manufacturers of mine cars and steam pumps, have business enough to keep them employed the first three months of the new year, and the outlook is bright for business beyond that time. Their output for the past year was one-third greater than that of 1902.

Johnston Bros., Ferrysburg, Mich., are planning a considerable enlargement of their plant, which, when completed, will about double the present capacity. In fact, some of the work has already begun, consisting of an addition to the blacksmith shop, about doubling its size; a new boiler house and new boilers; a new engine room, and complete new air plant. Further improvements contemplated are the erection of a tool room building, 50 x 150 feet, in which will be installed new tool equipment, such as a steam riveter with 10-foot stake, a large four-spindle boiler shell drill and a universal flanging machine, &c. It is hoped to have these improvements completed in time to take care of the usual spring rush of business. This company manufacture a full line of boilers, principally marine, in which they have had a very satisfactory trade during the past year and for which they expect a prosperous business in 1904, although indications point to somewhat lower prices and keener competition.

The Otto Gas Engine Works, Chicago, say that the past year's business was fully equal to that of 1902 and in some ways more satisfactory; they were able to get delivery of goods and an unlimited supply of labor, which made the situation easier. Present indications are good for 1904 trade. They have already contracts on hand that will require six months to install, and a liberal amount of orders are continually coming in.

Power Transmission and Conveying Machinery.

The Reeves Pulley Company, Columbus, Ind., report that the business of 1903 was larger than for any previous year. There was some noticeable decline in business activity in the last few months. Prospects for 1904 are not of a most flattering nature, although inquiries and prospective business are fair.

The Stephens-Adamson Mfg. Company, Aurora, Ill., say that they have done about 40 per cent. more business in 1903 than they did in 1902, and they expect as good or better business in 1904.

The Webster Mfg. Company, Chicago, say that the volume of their business for the year 1903 was considerably larger than that of 1902. During the last two months the trade has dropped off considerably, but it is again picking up, and while they do

not expect the great rush of orders experienced in 1903 repeated in 1904, yet they anticipate a good trade during the present year.

The Aetna Foundry & Machine Company, Springfield, Ill., report their business for 1903 as being 33 1-3 per cent. greater than that of 1902. Prospects for 1904 are very good, and they have orders booked to keep them running at least three months.

The Link-Belt Machinery Company, Chicago, have recently completed the erection of a structural iron shop and additions to tool equipment throughout their plant. Their output was about 15 per cent. greater in 1903 than the year previous, and indications are favorable for continued activity.

The Northern Engineering Works, Detroit, Mich., have during the past year added to their crane erecting shop and crane structural shop, making the total length of the building 200 feet, and have also constructed additional cranes for handling their product in yard and shop. The year 1903 was the best in their history, surpassing 1902 by 20 per cent. in the volume of output, which consisted principally of traveling and jib cranes. Sales of the Newton patent cupola were nearly double those of the previous year. Although trade is not as active now as it has been, the company anticipate a betterment in the early part of 1904.

The Chisholm & Moore Mfg. Company, Cleveland, Ohio, manufacturers of cranes, chain hoists, &c., report the output of 1903 as being 10 per cent. greater than the year previous. Trade, while somewhat quiet at present, shows evidence of a material quickening early in the present year.

The Jeffrey Mfg. Company, Columbus, Ohio, manufacturers of elevating, conveying and power transmission machinery, completed their modern machine shop during the past year, and with its up to date equipment they expect that 1904 will be a banner year. The output of 1903 was largely in excess of previous years. Business, while not so brisk at present, gives promise of encouraging conditions later in the year.

The Ewart Mfg. Company, Indianapolis, Ind., experienced a volume of business in 1903 about equal to that of the previous year. Indications with them are for a falling off in trade during the first six months of 1904.

Mining and Milling Machinery.

The Holthoff Machinery Company, Cudahy, Wis., are making an extension to their boiler shop, 137 x 193 feet, which will be practically completed by January 31, giving them a shop 435 feet long with an average width of 137 feet. Their equipment has also been increased by an expenditure of about \$25,000 for new tools. Other improvements and enlargements now under way are as follows: Extension to present machine shop, 117 x 250 feet, giving a shop when completed 115 x 450 feet; a new foundry, foundations for which are completed, 112 x 200 feet, arranged so as to extend same an additional 300 feet, giving a foundry building 500 feet by an average width of 112 feet. A new gas power plant upon the Loomis-Pettibone gas producer system, with their producers and Crossley gas engines, will be erected to the west and independent of the company's present building, so that the entire works will be operated by gas. The company have also added a story to their office building to afford extra facilities for drafting and engineering departments and clerical force. Their approximate output for the year 1903 was \$500,000, an increase of \$100,000 to \$150,000 over the previous year's business. They report trade conditions good. Inquiries are being received constantly, and they see no reason to anticipate a falling off in the mining machinery business. In addition to mining machinery they purpose taking up the manufacture of Loomis-Pettibone gas producers and Crossley gas engines. During the year the Loomis-Pettibone Gas Machinery Company of New York acquired possession of all the Holthoff Machinery Company's stock, and the interests of the above companies are now merged into "Power & Mining Machinery Company," under which title the business will be conducted after January 1, 1904.

The Salt Lake Engineering Works, Salt Lake City, Utah, built and equipped an entire new plant in 1903, consisting of foundry, machine shop, pattern shop, blacksmith shop and sheet iron working department. During the present year a modern office building, drawing office building, pattern storage building, stock sheds and several smaller buildings will be erected, and installation will be made of a large boring and turning mill, lathes, milling machines, shapers, beam shears and several minor tools. This company manufacture mining, milling, concentrating and smelting machinery, in which lines trade conditions were good up to November, when a slight falling off in trade was noticeable. Some time after the first of the year, however, improvement is looked for in business.

The F. M. Davis Iron Works, builders of mining and milling machinery, Denver, Col., purpose the installation of a new electric power plant at their works during 1904 at an approximate outlay of \$25,000. Their approximate output for 1903 was \$600,000, about the same as that for 1902, and now that labor troubles are practically over they anticipate an equally good business in 1904.

The D. Clint Prescott Company, Menominee, Mich., manufacturers of mining and saw mill machinery, are doubling their capacity, which will not be fully equipped until well along in 1904.

Their output for 1903 showed an increase of about 30 per cent. over 1902, and business still continues to increase.

The Colorado Iron Works, Denver, Col., manufacturers of smelting and mining machinery, report the business of 1902 about \$150,000 in excess of that of the year 1903, the average for the two years being about \$850,000. The difficulty experienced by promoters in raising money for new enterprises during the past six months led to the falling behind of 1903. The company expended during the past year \$20,000 for traveling cranes for their machine shop. These cranes have a length of travel of 130 feet each and a capacity of 15 tons. The company are figuring on several large contracts for 1904, several of which they are confident of securing. The past few weeks have been very encouraging for them in the business secured.

The Nelsonville Foundry & Machine Company, Nelsonville, Ohio, have under consideration the erection of a building for the construction of mine cars. Approximate output of their works for 1903 was 20 per cent. greater than that of the previous year.

Machinery and Tools.

Armstrong Bros. Tool Company, Chicago, report that business for 1903 showed an increase of about 25 per cent. as compared with the amount of business done in 1902. The last six months, while good ones, showed considerable falling off from the first six months of the year. Of late, however, a tendency to improvement has set in, and the company look for a very satisfactory trade in 1904.

The Fox Machine Company, Grand Rapids, Mich., report that sales for the first part of the year in their machine department were much in excess of the previous year. During the latter part, on account of strikes and disturbances in the money market, it fell much below last year's record. On the whole, the year's business shows an increase of between 10 and 20 per cent. over the previous year. They judge from the inquiries and orders which are coming in at the present time that the prospect is even better than it was a year ago. In their type-writer business, which is carried on in the same building but entirely separated, they find a steady advance during the whole year, the volume of business being 60 per cent. greater than the year previous.

McDowell, Stocker & Co., Chicago, say that their business for the year averages up very satisfactorily. The first six months of the year they had an exceptionally good trade, but the last six months did not prove quite so good, and the average was all that was anticipated. Total sales, however, were only about 5 per cent. in advance of 1902. The prospects for 1904 are not very flattering, yet at the same time they do not see anything in the commercial or industrial conditions that would cause a gloomy view of the year's business.

The Ransom Mfg. Company, Oshkosh, Wis., find that in 1903 they did 50 per cent. more business than during the year 1902, making it the most prosperous year of their history. This was due to the large business during the early part of the year, November and December business being light. They are having enough orders, however, to keep them running steadily, and look for an improvement in the near future.

The Hill Tool Company, Anderson, Ind., say that they had about 30 per cent. more business in 1903 than in 1902. The prospect for 1904 is very gratifying. The company expect to add several new articles to their lines during the present year.

The removal of the Aurora (Ill.) plant of the Chicago Pneumatic Tool Company of Chicago to Cleveland, and its consolidation with the latter plant, necessitated extensive improvements at the Cleveland works, which have been made during the past year, including the installation of considerable new machinery, greatly adding to the capacity and output of the combined plants. The Detroit plant of this company has been equipped with some new machinery, as has also the one at Franklin, Pa. The various plants of the company will undoubtedly undergo further enlargement in 1904 if business continues with the same activity as at present, but only future developments can determine what improvements will be made. The company estimate the output of 1903 as 33 1-3 per cent. greater than that of the year previous.

The Vulcan Iron Works, Chicago, manufacturers of hydraulic presses, report that since the first of November business has been dropping off, but they are now receiving a great many inquiries and the outlook is more promising.

The Adams Company, Dubuque, Iowa, report business light in some lines and very brisk in others. They are sold ahead some time on their millers used on iron planers. Prospects for 1904 are very good.

The Chas. F. Elmes Engineering Works, Chicago, report that the year 1903 was an improvement over the year 1902, the number of orders increasing with their old trade and a number of new customers having been secured. During the month of October, and especially that of November, orders were not as heavy as the balance of the year, but during December orders were coming in very fast, there being enough now on hand to keep their plant running well into the spring. In fact, prospects are very encouraging based on the orders booked for the next year.

The Bignall & Keeler Mfg. Company, Edwardsville, Ill., advise that the past year has been a very satisfactory one, showing

an advance over 1902 of a little over 5 per cent. They have quite a number of orders on their books, and inquiries so far have been strong, a great many having come from the Pacific Coast.

The American Machinery Company, Grand Rapids, Mich., say that a comparison of sales for 1902 and 1903 shows an increase of 29 per cent. for the latter year. Reports from travelers and correspondence indicate that their business during the coming year will show at least as great a percentage of increase as has the past year. At no time have they had more inquiries which gave promise of developing into orders than they have at present; yet on all sides there is an apparent disposition to conservatism and to postpone purchases as long as possible.

The Gardner Governor Company, Quincy, Ill., report that 1903 business showed an increase of 10 per cent. over that of the previous year, and would have been at least 30 to 50 per cent. better had not labor difficulties interfered. Their business has fallen off somewhat for the last 30 days, but this is a natural condition at this period of the year.

The Hoefler Mfg. Company, Freeport, Ill., report that business was good the past year, although they had to fight labor the greater part of their best season. The outlook for next year is good.

The George Whiting Company, Chicago, say that they did about 50 per cent. more business in 1903 than during the previous year. Collections have been good and general trade conditions have been very satisfactory. The year 1904 from their standpoint seems to be a fair year, judging from the business now in sight, particularly in small units with close margins of profits. If business continues at its present volume during the first two months of the year, they expect to have to add equipment to handle it.

Williams, White & Co., Moline, Ill., early in the past year moved into their new machine shop, which was completed in 1902. They have equipped their foundry with side cranes, one of them being electric, and have also added center cranes. Their output for 1903 exceeds that of 1902 by about 30 per cent. Trade conditions are a little quieter in their line of machinery than they have been. The company have largely increased their patterns of punches and shears, particularly the deep throats, and now have a large and complete line.

The Marion Steam Shovel Company, Marion, Ohio, contemplate some few additions to their plant during the present year in order to take care of the constantly increasing volume of business.

Foundries.

The Chicago Malleable Castings Company, West Pullman, Chicago, have during the year made the following improvements to their plant: Built a new brick molding shop, sufficient for 50 molders; two new motor houses, in which have been installed the latest type of Sturtevant volume blowers; six new annealing ovens, 25 to 30 tons capacity; new melting furnaces, 12 tons capacity, and additional tumbling barrels. The approximate output for the year was an increase of 80 per cent. over that of 1902, and in 1904 a still greater increase is expected. A fair volume of business is looked for between January and July, particularly from consumers along the Mississippi and Missouri rivers.

The Milwaukee Malleable & Gray Iron Works, Milwaukee, Wis., adding one melting furnace and one large cupola to their plant during the past year. Output of the year one-third greater than in 1902.

The Ross-Mehan Foundry Company, Chattanooga, Tenn., during the year increased the capacity of their gray iron department one-quarter, the capacity of their malleable department by one-third, and added to their gray iron department equipment a 36-foot span 25-ton traveling crane, with a runway 225 feet long. The output of their plant for 1903 was 17 per cent. greater than that of the preceding year. They find general trade conditions satisfactory, having enough orders booked and in sight to consume the bulk of their output until June, 1904.

The Moline Malleable Iron Company, St. Charles, Ill., have installed at their plant a complete system of removing dust from the milling room and emery wheels. They also put in the Sturtevant system of heating. Their output for the year was about 4000 tons, or practically the same as 1902. Trade conditions in their line are very good.

The St. Paul Foundry Company, St. Paul, Minn., made improvements to their works as follows during 1903: Enlargement of structural steel shop by addition 70 x 180 feet, making the shop now 350 feet long; a templet room, 35 x 70 feet; enlargement of the main foundry of 107 x 150 feet, making that building now 400 feet long. Their tonnage for 1903 was about 20 per cent. heavier than the previous year. A much lighter business is looked for in 1904 than during the two previous years, there being a holding off on the part of users of architectural iron work and structural shapes in anticipation of better labor conditions and lower prices.

The Illinois Malleable Iron Company, Chicago, have made considerable improvements to their works during the year just closed. They anticipate good business during the coming year.

The Beaver Dam Malleable Iron Company, Beaver Dam, Wis.,

have increased their capacity materially during the year and have produced an approximate tonnage of 7000 tons, or 3000 tons greater than in 1902. Business, while light in December, promises to improve.

The Northwestern Foundry & Supply Company, Detroit, Mich., increased their capacity 40 per cent. in 1903, erecting a molding room, 64 x 100 feet, and a core room, 48 x 64 feet, with two large modern ovens, as well as installing considerable pneumatic machinery throughout their entire plant. An increase of 30 per cent. is noted in the business transacted in 1903 over the previous year, and the prospects are very encouraging for continued prosperity.

The Marion Malleable Iron Works, Marion, Ind., report a falling off in trade of about 20 per cent. in 1903 as compared with the previous year, with prospects not very encouraging for 1904.

The Massillon Iron & Steel Company, Massillon, Ohio, manufacturers of cast iron pipe and fittings, expect to increase their capital stock to \$300,000 some time this month. Their output for the past year was 25 per cent. greater than in 1902.

The Union Malleable Iron Company, East Moline, Ill., report business for the year 1903 about equal to the previous year. Trade, while on the decline during the past two months, gives evidence of improvement in the near future.

The Northwestern Malleable Iron Company, Milwaukee, Wis., experienced a falling off of about 10 per cent. in business for 1903 as compared with the year 1902. Improvements made at the company's plant during the year amounted to \$30,000.

The Sanford-Day Iron Works, Knoxville, Tenn., expect to enlarge their foundry capacity about 30 per cent. in 1904. They have erected a two-story building which will be utilized for pattern and casting storage purposes and also a two-story brick building for stove mounting and warehouse room, together with rooms for wood and iron working machinery and car erecting shop. A. Whitney of A. Whitney & Sons, Philadelphia, has identified himself with this company, and they are now prepared to make car wheels of Whitney design.

The Knoxville Wheel & Foundry Company, Knoxville, Tenn., expect to double their capital stock, which is now \$5400, some time during the present year. It is their intention to build a modern brick foundry, one story, 70 x 80 feet, together with a two-story pattern shop, storage room and office. Their output showed considerable increase the past year over 1902, and they report prospects for business this year better than ever. They will add to their line of manufacture during the year heating and cook stoves.

The Buckeye Malleable Iron & Coupler Company, Columbus, Ohio, during the year 1903 erected and put in operation a steel foundry having two 20 and one 10 ton open hearth furnaces, with ability to make either basic or acid steel castings. Their approximate output for the year was 24,000 tons, an increase over 1902 of 14,000 tons. General trade conditions during the year were good except during November and December, but the outlook for business in 1904 is good.

The Pine Bluff Iron Works, Pine Bluff, Ark., have during 1903 built a new foundry and machine shop, enlarged their old buildings and added new machines in their machine shop department. During the early part of the present year they will build an addition to their foundry and will also put in a larger cupola and install additional brass furnaces. Orders in sight call for a greatly increased capacity. Their 1903 business was double that of the previous year.

The A. E. Shortbill Company, Marshalltown, Iowa, expended \$15,000 the past year in improvements, and will doubtless also make further expenditures this year if business conditions warrant. Their business has been steadily growing, the year 1903 being their banner year.

Railway Equipment.

The Morden Frog & Crossing Works, Chicago, have completed the erection of three large brick and steel buildings, covering a ground area of 410,000 square feet. Installations of machinery and tools have been made representing a cost of \$100,000. The company have also replaced their old steam power plant with an electric plant of alternating system, including new boiler, engine, generator, &c., which furnishes electric power for the entire works. The company's output for the year 1903 was about one-third greater than the previous year. Business has dropped off somewhat of late, but trade is expected to be equally as good in 1904 as it was in 1903.

The Kalamazoo Railway Supply Company, Kalamazoo, Mich., have built entire new works, consisting of five brick and cement buildings. Their approximate output for 1903 was about equal to that of 1902.

Ellis Woolman, Minneapolis, Minn., manufacturer of railway equipment and material, recently completed a shop for the rebuilding of locomotives and repairing of steam shovels. Machinery will be installed some time during the present winter. A building is also contemplated for the rebuilding of passenger cars and will probably be erected during the present year, as will also an addition to the machine shop.

The Chattanooga Car & Foundry Company, Chattanooga, Tenn., report the outlook good for 1904 business, orders being

very plentiful at the present time. Their 1903 business was greater than that of 1902.

The Sheffield Car Company, Three Rivers, Mich., have increased their capacity threefold or greater by the erection of a large brick wheel building and a new foundry. Their approximate output for the past year amounted to \$800,000, which was about 25 per cent. greater than that of 1902, and in excess of any previous year.

The Mt. Vernon Car Mfg. Company, Mt. Vernon, Ill., added to their equipment in 1903 bulldozers, arch bar drills, Bradley hammers, forging and some additional machinery. Their output for the year fell short of 1902 in the aggregate, business within the past few months having fallen off materially.

The Truax Mfg. Company, Denver, Col., are now giving more attention to the designing and building of special service cars of all kinds in addition to their former line of general ore cars. They report the trade outlook as encouraging.

The Chicago Car & Locomotive Works, Chicago, successors to the Pease Car & Locomotive Works, have, since the reorganization of the company, which took place last July, built over 200 cars, rebuilt 14 locomotives, besides doing a general line of work, such as building grading machines, electric cars, &c. They have installed additional machinery and made a number of permanent improvements, giving them a capacity of six cars per day in their car shops, and a capacity of six engines per month in their locomotive shops. The company report that trade conditions were good up to October 1, since which time there has been a decided falling off.

The Cleveland Car Company, West Park, Ohio, built an entirely new plant during the past year, equipping it in an up to date manner for the manufacture of industrial railway equipment, such as the construction of cars to be used in rolling mills, foundries, coal mines, coke ovens, steel plants, &c. This company are experiencing an excellent volume of business, which if it continues will necessitate further enlargement of their works in 1904, and the addition of a foundry will be the first move in this direction.

The Fulton Pitt Car Company, Canal Fulton, Ohio, purpose increasing their capital stock in the near future from \$10,000 to \$50,000. Improvements which they will make this year embrace the erection of a plant and the installation of machinery for the manufacture of industrial steel cars. Their output for the year was about \$50,000, which is greater than any other year in their history. Trade conditions have been good until the past two months, when a falling off was experienced, but a resumption of activity is taking place and the outlook is very bright for future trade.

The East St. Louis Locomotive & Machine Shop Company, East St. Louis, Ill., organized December 13, 1902, have during the 11 months which they have been working turned out 22 locomotives and have four now in process of repair. They also rebuilt one large steam shovel, besides doing numerous small jobs of repair work in the machine shop. The shop, which they at first rented and during the early part of the year equipped with necessary machinery and tools for the operation of a general repair and machine shop, has since been purchased by them and additional improvements have been made, including the building of a pit track house, having a capacity of six locomotives at one time; a new office building, with office rooms on the first floor and a pattern and drafting room on the second floor, and the construction of 1500 feet of storage tracks. The company report trade conditions good, and that if their business requirements necessitate it further enlargements to their plant will be made during 1904.

Shipbuilding Plants.

The Jenks Ship Building Company, Port Huron, Mich., have enlarged their machine shop by building an addition 40 x 120 feet, and have installed a new 8 x 10 foot planer, a new radial drill, electric traveling cranes, &c. Business in their line is very quiet.

The Racine Boat Mfg. Company, Muskegon, Mich., late of Racine, Wis., will supply their new plant with a 250 horsepower Nordberg-Corliss engine, a 150-kw. generator, a 400-foot air compressor of the Nordberg type and other electrical equipment. With the excellent facilities at their new quarters they expect to double last year's output in 1904, which, notwithstanding a fire early in the year, amounted to over \$300,000 in value of sales.

The large shipbuilding plant built by the Great Lakes Engineering Works, Detroit, Mich., embodies one of the important developments in the West during the past year. There are four shipbuilding berths, 600 feet in length, equipped to hold four of the largest vessels used on the great lakes at one time. The buildings of the plant comprise the following, all built of steel: Boiler shop, 150 x 300 feet; plate and shape building, 150 x 300 feet; plate and shape stock building, 150 x 300 feet; mold loft, 50 x 250 feet; joiner shop, 50 x 150 feet; warehouse, 100 x 100 feet; tool and rivet shop, 40 x 80 feet; repair machine shop, 40 x 60 feet; blacksmith shop, 40 x 60 feet; sheet metal shop, 40 x 60 feet; pipe shop, 40 x 60 feet; furnaces, 70 x 90 feet; saw mill, 40 x 50 feet; offices and drawing room, 40 x 90 feet; riggers' shop, 25 x 60 feet. The equipment of the plant embraces the largest and most up to date machinery, all

of which is electrically driven. The company's business during 1903 was twice that of the previous year, and in 1904 they expect to double the trade of 1903. Trade conditions are good, and business, while slightly checked at the present time, shows evidence of great improvement during the present year.

Bolts, Nuts, Rivets, Washers.

The Lamson & Sessions Company, manufacturers of bolts, nuts, rivets and wrenches, Cleveland, Ohio, report that their output for the first half of 1903 compared favorably with the past two or three years, but it has been very much less for the last half of the year. They anticipate a marked increase in activity in 1904.

The Kansas City Bolt & Nut Company, Kansas City, Mo., have installed a galvanizing department at their plant. Their business in 1903 was far in excess of any previous year.

The E. B. Lanman Company, manufacturers of nuts, washers and carriage hardware specialties, Columbus, Ohio, report that trade conditions are better than they have been for some months, and they believe that a firm basis of price in iron and steel bars would start a buying movement which would be satisfactory to all the manufacturers in their line.

The Wrought Washer Mfg. Company, Milwaukee, Wis., have added to their equipment during the past year one large heating furnace with waste heat boiler attached for their 18-inch plate mill, and some new punching machinery. Equipment for the rapid handling of material has also been added. Two and one-half acres of ground adjoining their present plant has also been purchased, giving additional shipping and storage facilities. The company report that trade has fallen off somewhat the past two months.

The National Elastic Nut Company, Milwaukee, Wis., have several times during the past year added machinery and equipment to their plant to better handle their large business, and also have under consideration the installation of additional machinery during 1904, as well as the extension of their plant by the erection of buildings. The total output for the year was practically that of the year previous, for though considerably larger the first part of the year, it was greatly curtailed during the latter months. There is every indication now, however, that a marked improvement is taking place.

Isaac Church, manufacturer of expansion bolts, Toledo, Ohio, reports sales during the year 1903 in excess of those of 1902. He also says that December trade was quiet, but that the outlook for 1904 is good.

The Michigan Bolt & Nut Works, Detroit, Mich., have nearly completed an addition to their plant, 40 x 500 feet. The company added quite materially to their machinery equipment during the year and increased their capital stock from \$200,000 to \$300,000. Their approximate output shows a falling off of 10 per cent. as compared with 1902. There seems to be a better feeling now, however, which is becoming more and more pronounced.

Pipes and Tanks.

The output of the Pressed Steel Tank Company, Milwaukee, Wis., was 30 per cent. greater in 1903 than during the previous year, with present trade conditions still good.

The Tollerday Steel Pipe & Tank Company, Waterloo, Iowa, have increased their capital stock from \$30,000 to \$60,000. The company have under advisement the enlargement of their plant during the year, but nothing has been determined upon as yet. They report the booking of excellent orders for shipment during the first quarter of 1904 and that indications are for a heavy trade during the year.

Agricultural Machinery.

The Oliver Chilled Plow Works, South Bend, Ind., made the following additions to their plant during the year 1903: Smith shop, 100 x 450 feet; sulky and steel plow shop, 100 x 350 feet; grinding and polishing shop, 60 x 196 feet; glue room, 20 x 30 feet; tempering room, 32 x 96 feet; warehouse, 174 x 215 feet; wood shop templet room, 30 x 64 feet; gas plant, 22 x 76 feet; factory barn, 34 x 120 feet; locomotive house, 29 x 74 feet; dust separator house, 10 x 34 feet; elevator pump house, 10 x 20 feet. During 1904 the plant is to be arranged for the running of all machinery by electric power, generated by water power recently acquired by the company. The company's output for 1903 was considerably in excess of that for the previous year, and trade conditions at the present time are very satisfactory.

The Port Huron Engine & Thresher Company, Port Huron, Mich., have doubled their capacity during the last few months of the past year, giving them a capacity of 200 tons per month. The trade conditions in their malleable department are fairly good.

Miscellaneous.

W. H. Anderson & Sons, Detroit, Mich., makers of contractors' tools for sewer and cement work, have under consideration the enlargement of their lines of manufacture, and this plan if carried out will mean the expenditure of approximately \$150,000 for new buildings, machinery, &c. Their business during 1903 was a good one and will compare favorably with either of the years 1901 or 1902, which were the largest in the company's history. The general indications are very good in all branches, the most active at present being in forgings and tools used by

automobile and gasoline engine manufacturers. Tools for the stone and building lines have been moving a little slower the last half of the year. Cement working tools for laying stone walk, driveways, &c., have had an unusually large sale during the past year. Many of the wholesale jobbing houses, finding the demand increasing, have taken up the line with a very satisfactory margin of profit to themselves. Their sales on cold chisels, agricultural punches, &c., have been very large during 1903, many heavy stock orders being received during the early part of the year. There is a tendency at present to order oftener and in smaller quantities. The foreign branch of their business in this line shows a satisfactory growth, covering Russia, Holland, Spain, Hungary, Switzerland and South Africa. During the past 30 days they have quoted on a volume of business for spring delivery that leads them to believe that they will see a good season of business in 1904.

The Kilbourne & Jacobs Mfg. Company, Columbus, Ohio, manufacturers of wheelbarrows, contractors' machinery, road scrapers, &c., have just completed improvements and enlargements to their plant which have been under way for the past two years, which will practically double their previous capacity. An increase in capitalization of \$250,000 in the past two years has been made. The output for 1903 shows an increase of 25 per cent. over that of 1902, which was the largest in the company's history.

The Warrington Iron Works, Chicago, do not anticipate as good a business in 1904 as experienced in either of the two preceding years, as the depression in financial circles very materially affects their trade and they are dependent wholly upon staple goods, such as boiler makers' tools and safety valves, for their output.

The Acme Mfg. Company, Lancaster, Ohio, will equip their plant with modern machinery during the year 1904. They doubled the capacity of their foundry last year. The company make a specialty of adjustable storm curtain frames.

The Woeber Carriage Company, Denver, Col., had been contemplating the modernizing of their plant during the coming season, but now state that the outlook at present is hardly such as to warrant the additional investment. They build steel cars, in addition to wagons, carriages, omnibuses and other vehicles.

The Milwaukee Wagon Iron Works, Milwaukee, Wis., experienced 25 per cent. more business in 1903 than the year previous. Trade is quiet at the present time.

The Lewis Spring & Axle Company, Jackson, Mich., during this past year installed compressed air traveling cranes, as well as other machinery, at their plant, increasing its capacity at least one-third. Trade in their line seems to be improving, and the general outlook is good for 1904.

Lee & Porter, Dowagiac, Mich., have increased their capacity for automobile parts. Their output of long distance and ball bearing axles in 1903 was about double that of the previous year.

The Duluth Corrugating & Roofing Company, Duluth, Minn., report 1903 business as showing a considerable increase over 1902. The company anticipate the erection of a large brick factory. Indications are good in their line for 1904, as building operations promise to be extensive, and the reduced price of steel sheets will create more of a demand for roofing, siding, &c.

The Interstate Steel Company.—The Interstate Steel Company of Pittsburgh have completed and placed in operation their plant at Avenue, on the West Penn Railroad. The new plant is located near that of the Allegheny Steel & Iron Company. The officers of the latter company are the principal stockholders in the Interstate Steel Company. The plant contains a 24-inch mill for cold rolling "velvet blue" sheets for stoves, ovens and stamping purposes. The sheets are obtained from the plant of the Allegheny Steel & Iron Company, and are treated and rolled by a patented process. The company have organized with \$200,000 capital stock. Capt. Alfred Hicks is president, L. W. Hicks treasurer and George A. McLean secretary.

The *Metal Industry* reports that the new year has brought about several changes in the working arrangement of the American Brass Company of Waterbury, Conn. The Holmes, Booth & Haydens plant in Waterbury has been placed under the superintendency of Charles S. Morse, who will operate it in connection with that of the Benedict & Burnham Company, situated directly across the Naugatuck River. The casting for both plants will be done at the Benedict & Burnham mill, while the manufacture of brazed tubing will be carried on at Holmes, Booth & Haydens. It is rumored that the casting for the Waterbury Brass Company, also one of the American Brass Company's mills, will eventually be done at the Benedict & Burnham plant.

The Iron and Metal Trades.

Our monthly statistics of the Pig Iron industry show that it reached a very low ebb in December, the product of the Coke and Anthracite furnaces having fallen to 852,575 tons in December, as compared with a rate of over 1,550,000 tons during the summer months. This decline is due principally to the lessened output of the great Steel companies, the outside furnaces, notably those making Foundry Iron, not having fallen off in so heavy a proportion. The active capacity on January 1 had fallen to 187,545 tons, which would indicate a January output of only a little over 800,000 tons, but it will probably be considerably greater because a considerable number of the blast furnaces of the United States Steel Corporation have started since the opening of the year, with others to follow.

Stocks in the hands of the outside furnace interests are practically stationary, a moderate decline in the South having been counterbalanced by an increase in the Northern districts. There has been, however, quite a notable addition to stocks of Charcoal Pig Iron during the month of December.

At the rate at which the furnaces not directly owned by the Steel plants were producing in December, which was 445,845 tons, production and consumption were apparently closely balanced. The starting of the furnaces of the Steel makers shows that they have cleared up the greater part of their accumulations, and that consumption in that quarter is more normal. The reserve capacity, however, in all directions, except possibly in the South, is very great, so that no serious forward movement seems possible, particularly in view of the ample stocks.

The event of the week in the Finished Iron and Steel markets is the slight advance made by the leading interest in the Wire trade. It is significant chiefly in showing that consumption is good in the many small trades and industries to which these products go, and confirms the general conviction that the farming and allied interests are not alone sound but prosperous. It does not, however, reflect any notable improvement in the heavy lines, which are still depressed although a somewhat better tonnage is coming out. This is true of Structural Material, some good orders for bridges and for buildings having been placed, with others in sight. The Plate mills are also getting more work, but it is far, as yet, from putting them into an even fairly good position. Conflicting reports come out relative to the Bar trades, there being a better movement in some quarters while in others complaints of low prices are being made.

In the Pittsburgh market some very heavy sales at advancing prices of Steel Scrap have been made, with further business pending.

It appears that a considerable tonnage of Steel is being placed abroad, at about 75 shillings delivered, with ocean freights at 11 shillings.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,
Declines in Italics.

At date, one week, one month and one year previous.

	Jan. 13, 1904.	Jan. 7, 1904.	Dec. 16, 1903.	Jan. 14, 1903.
PIG IRON:				
Foundry Pig No. 2, Standard, Philadelphia	\$14.70	\$14.75	\$15.00	\$22.25
Foundry Pig No. 2, Southern, Cincinnati	12.50	12.00	12.25	21.75
Foundry Pig No. 2, Local, Chicago	14.00	14.50	14.50	23.50
Bessemer Pig, Pittsburgh	13.85	14.10	14.35	21.85
Gray Forge, Pittsburgh	12.75	13.00	13.00	20.50
Lake Superior Charcoal, Chicago	16.75	16.75	16.50	25.00
BILLETS, RAILS, &c.:				
Steel Billets, Pittsburgh	23.00	23.00	23.00	29.50
Steel Billets, Philadelphia	24.25	24.25	24.50	26.50
Steel Billets, Chicago	24.00	24.00	24.00	29.50
Wire Rods, Pittsburgh	30.00	30.00	31.00	34.50
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00
OLD MATERIAL:				
O. Steel Rails, Chicago	10.00	9.00	10.75	18.50
O. Steel Rails, Philadelphia	11.50	11.50	11.50	20.75
O. Iron Rails, Chicago	13.00	13.00	13.00	24.00
O. Iron Rails, Philadelphia	16.00	16.00	16.00	23.50
O. Car Wheels, Chicago	13.00	13.00	13.00	24.00
O. Car Wheels, Philadelphia	12.75	12.75	12.75	20.50
Heavy Steel Scrap, Pittsburgh	12.50	11.00	11.00	21.00
Heavy Steel Scrap, Chicago	10.00	10.00	9.00	18.00
FINISHED IRON AND STEEL:				
Refined Iron Bars, Philadelphia	1.25	1.35	1.35	1.92½
Common Iron Bars, Chicago	1.32½	1.30	1.35	1.75
Common Iron Bars, Pittsburgh	1.34½	1.24½	1.34½	1.70
Steel Bars, Tidewater	1.44½	1.44½	1.44½	1.75
Steel Bars, Pittsburgh	1.30	1.30	1.30	1.60
Tank Plates, Tidewater	1.74½	1.74½	1.78	2.10
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.75
Beams, Tidewater	1.74½	1.74½	1.73½	1.75
Beams, Pittsburgh	1.60	1.60	1.60	1.90
Angles, Tidewater	1.74½	1.74½	1.73½	1.75
Angles, Pittsburgh	1.60	1.60	1.60	1.90
Skelp, Grooved Iron, Pittsburgh	1.50	1.50	1.45	1.90
Skelp, Sheared Iron, Pittsburgh	1.60	1.50	1.55	1.95
Sheets, No. 27, Pittsburgh	2.20	2.25	2.25	2.65
Barb Wire, f.o.b. Pittsburgh	2.50	2.45	2.45	2.50
Wire Nails, f.o.b. Pittsburgh	1.90	1.85	1.85	1.90
Cut Nails, f.o.b. Pittsburgh	1.79	1.90	1.90	2.05
METALS:				
Copper, New York	12.75	12.37½	12.37½	12.25
Spelter, St. Louis	4.70	4.75	4.50	4.65
Lead, New York	4.45	4.25	4.25	4.10
Lead, St. Louis	4.20	4.17½	4.15	3.97½
Tin, New York	29.25	29.00	27.75	27.95
Antimony, Hallett, New York	6.50	6.25	6.25	7.00
Nickel, New York	40.00	40.00	40.00	40.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.79	3.79	3.79	3.79

Chicago.

FISHER BUILDING, January 13, 1904.—(By Telegraph.)

We are experiencing period of wavering in nearly every Iron and Steel commodity, with a possibility of either an advance or a decline, no one knows which. The usual January boom is making itself felt, but whether this is only the psychological manifestation of the habit of mankind to take a fresh grip on the first of the new year, or whether there is some real foundation for it, time only will tell. It must be confessed that the upward tendency is not as strong as might be wished on the part of the seller. Northern Pig Iron producers have reduced their prices to the point where they are taking a great deal of business away from the Southern furnaces in this market. For some months the gaze of the Iron buyer has been turned southward, but with only 15c. difference between Northern and Southern No. 2 Iron in the Chicago market a rapid rightabout face has been executed, and while the South is wondering what has happened the North is reducing its mountain high piles of accumulated Iron. An indication of general conditions is the fact that melters, who bought Southern Iron rather heavily on the rising market in the last weeks of December, are now giving orders that shipments intended for January should be deferred. Only three Northern merchant furnaces are in blast in this district, with only two Illinois Steel Company's stacks out of 17 at South Chicago in blast. Bar Iron has advanced 50c. to \$1 per ton and shows considerable strength at these figures. Linked with this is a firming up in prices on Old Materials. Indications for a resumption of building in the Southwest, West and Northwest are seen on every hand. The Plate business is quiet, with the average Chicago consumer loath to pay the present delivered price, which is higher than it has been for a long

time, in the face of lower prices on many other lines. Boiler Tubes and Merchant Pipe are moving with only a fair activity. Sheets continue weak, with independent mills bidding for business at whatever prices will land it. Cast Iron Pipe is weaker in price and none too strong in volume of business booked. There is but little doing in Rails and Track Supplies. Merchant Steel is only fairly active. The Coke business is extremely quiet, with the tendency to lower prices. Each man's opinion of what the future will bring forth is an expression of that man's temperament and digestion, with the majority slightly inclined to prophesy a lowering in prices, instead of an advance.

Pig Iron.—The feature of the week's business in Pig Iron is the transfer of buying activity from Southern to Northern Irons. The moment the Southern interests planted themselves squarely on a \$10 basis Northern producers who had not already done so reduced their price of No. 2 to \$14 at the furnaces. Ten-dollar Iron at Birmingham costs the Chicago melter \$13.85, and with Northern Iron at \$14 or thereabouts preference is given to the Northern Iron by the majority of melters for several reasons, chief among which is the fact that Northern Iron can be ordered one day and received almost the next, making the date of payment about 30 days after actual receipt of the Iron, while Southern Iron is billed the day shipped, and frequently the bill becomes due almost as soon as the Iron reaches the melter. Another point of disadvantage the Southern producers labor under is the disinclination on the part of melters to pay cash for freight at the rate of \$3.85 per ton on the Iron. If there is anything the average foundryman objects to, it is paying cash for anything. Another feature of the Iron situation is the fact that large tonnages of Iron that were bought on the rise between \$9 and \$10 for January shipment are being practically thrown back on the market by the action of the purchasers in ordering delay of shipment. This series of delay orders coming from all quarters of the country indicates that melters are not as badly off for Iron as might have been supposed, or that they have so few orders on their books that they require but little Iron just now. During the last five or six days Northern Iron has been moving freely in from 100 to 1000 ton lots, and the Northern producer is at last having the satisfaction of seeing his stock piles decreasing. Southern Iron, while still held at \$10, base, for No. 2, is weak at that price, and it will require a superhuman effort on the part of the Southern producers to maintain the \$10 basis, unless something happens to increase the demand. We reduce our prices on Northern Foundry, Northern Scotch and Ohio Strong Softener Irons 50c. per ton, and increase our price on Southern Mottled 25c. per ton, to make it agree with the \$10 for No. 2. In the following prices the first column indicates prices for the first quarter and the second column prices that most of the interests are asking for second-quarter delivery:

Lake Superior Charcoal.....	\$16.75 to \$17.25
Northern Coke Foundry, No. 1.....	14.50 to 15.00
Northern Coke Foundry, No. 2.....	14.00 to 14.50
Northern Coke Foundry, No. 3.....	13.50 to 14.00
Northern Scotch, No. 1.....	15.00 to 15.50
Ohio Strong Softeners, No. 1.....	16.30 to 16.80
Ohio Strong Softeners, No. 2.....	15.80 to 16.30
Southern Silvery, according to Silicon.....	15.35 to 16.35
Southern Coke, No. 1.....	14.35 to 14.85
Southern Coke, No. 2.....	13.85 to 14.35
Southern Coke, No. 3.....	13.35 to 13.85
Southern Coke, No. 4.....	12.85 to 13.35
Southern Coke, No. 1 Soft.....	14.35 to 14.85
Southern Coke, No. 2 Soft.....	13.85 to 14.35
Foundry Forge.....	12.85 to 13.35
Southern Gray Forge.....	12.60 to 13.10
Southern Mottled.....	12.35 to 12.85
Alabama and Georgia Car Wheel.....	19.85 to 19.85
Malleable Bessemer.....	14.50 to 15.00
Standard Bessemer.....	16.30 to 16.80
Jackson County and Kentucky Silvery, 6 to 10 per cent. Silicon.....	17.30 to 18.80
Basic Southern.....	14.35 to 14.85

Bars.—Bar Iron is showing considerable strength, and 1.30c. is no longer quoted by any interest, with 1.32½c. quoted only in exceptional cases in large tonnages and to regular customers; 1.35c. is the current market price for Iron Bars to the average consumer in car lots, with some producers attempting to get 1.37½c. to 1.40c. Steel Bars remain at 1.46½c., with a fair tonnage moving. The implement manufacturers are evidently specifying more heavily than for some time, although they have not yet started to specify at the gait which the mills would like to see. We quote: Bar Iron, 1.32½c. to 1.40c., base, half extras; Bar Steel, 1.46½c., base, half extras, with quarter extras for rounds and squares larger than base; Hoops, 1.81½c. to 1.91½c. rates, in carload lots, with 10c. advance for less than cars; Small Angles, Beams, Channels and Zees, 1.56½c. to 1.66½c., base, half extras; Small Tees, 5c. advance. Store business is still improving, with 1.65c. to 1.70c., base, half extras, for Steel Bars, the average quotations, the price of 1.60c. being only quoted to large regular buyers in round lots from store when necessary to meet competition. Iron Bars from store are being offered at the same price as Steel, with full card extras in place of half extras. Hoops from store are offered at 2.10c. to 2.20c. rates, full extras.

Structural Material.—Large factors in the Structural trade claim that inquiries are coming in more actively than

they have for several months, particularly for Steel buildings of medium size, both from Chicago and from Western cities. The low prices that are being made by both mills and large Structural Iron works on fabrication have greatly reduced the cost of Steel buildings compared with what they have been for the last two years, even though the price on the Steel itself remains at 1.60c., base, Pittsburgh. We quote: I-Beams and Channels up to and including 15 inches and Angles 3 inches on one leg and larger, 1.76½c., Chicago; Ties, \$1 per ton extra. Structurals are finding rather better sale from store than for some weeks, and sales are being made at 1.95c. to 2c. cut to lengths 5 feet and over, with here and there sales made at 1.90c. to large buyers.

Plates.—The Plate business has naturally fallen off, as the leading buyers in this section anticipated their wants before the 1.75c. association price was raised to 1.76½c., on the new basis of selling. Some independent factors, notably the Sheet mills, are offering Plates 48-inch and narrower at a lower price than the association, as the present price of Billets and Bars permits them to shade the association price and still make a profit. We quote: Tank Steel, ¼-inch and heavier, 1.76½c. to 1.86½c.; Flange, 1.86½c. to 1.96½c.; Marine, 1.96½c. to 2.06½c.; Universal Mill Plates, 1.76½c. to 1.86½c. From store Plates are selling at 2c. for Tank quality, ¼-inch and heavier; 2.10c. for 3-16; 2.15c. for No. 8; 2.20c. for No. 10, with 25c. per 100 lbs. for Flange quality.

Boiler Tubes.—No change is made in last week's quotations, either in Lap Weld or Seamless Steel Tubes, and while the trade is fair it is not as large as had been expected. While quotations are nominally for carload lots, and it is the tradition of the trade that less than carload lots should sell at 12½ per cent. higher, this advance for less than carloads is seldom obtained, the buyer usually paying only the difference between the car lot and less than car lot freight from mill. We quote the following discounts for carload lots, f.o.b. Chicago, in which 1.65 per cent. has been subtracted from the new Pittsburgh basing discount to take care of the 16½c. freight on carload lots of Boiler Tubes from Pittsburgh to Chicago:

	Discounts, per cent.		
	Steel.	Iron.	Seamless steel.
1 to 1½ inches.....	42.35	38.85	53.35
1½ to 2¼ inches.....	54.85	37.35	40.35
2½ inches.....	57.45	42.35	40.35
2½ to 5 inches.....	63.35	49.85	48.35
6 to 13 inches.....	54.85	37.35	....

Chicago jobbers report an active trade on Boiler Tubes from store at the following discounts, f.o.b. warehouse:

	Steel.	Iron.	Seamless steel.
1 to 1½ inches.....	40	35	37½
1½ to 2¼ inches.....	50	32½	35
2½ to 5 inches.....	60	45	45
6 inches and larger.....	50	32½	..

Sheets.—The unsettled condition of the Sheet trade makes it difficult to quote prices, though a fair representation of prevailing quotations is as follows: No. 10, 1.91½c. to 1.96½c.; No. 12, 1.96½c. to 2.01½c.; No. 14, 2.01½c. to 2.06½c.; No. 16, 2.11½c. to 2.16½c.; Nos. 18 and 20, 2.16½c. to 2.26½c.; Nos. 22 and 24, 2.26½c. to 2.36½c.; No. 26, 2.36½c. to 2.41½c.; No. 27, 2.41½c. to 2.46½c.; No. 28, 2.46½c. to 2.51½c. Warehousemen have reduced their prices on light gauges of Sheets \$1 per ton at least, possibly more. We quote as follows: Nos. 18 and 20, 2.50c. to 2.55c.; Nos. 22 and 24, 2.60c. to 2.65c.; No. 26, 2.70c. to 2.75c.; No. 27, 2.80c. to 2.85c.; No. 28, 2.85c. to 2.90c. Galvanized Sheets are sluggish at 80 to 80 and 2½ discount, Pittsburgh, plus full freight, in either car lots or less than car lots. Prices from store are 75 and 5 to 75 and 7½ discount, f.o.b. warehouse, Chicago.

Merchant Pipe.—It is pretty generally understood in the trade that independent Pipe producers are shading the reduced official prices named by the leading producers, as published last. Pipe business is reported to be good for this season of the year. The quotations of the leading producer are on the basis of the following discounts in carload lots, Chicago:

	Steel Pipe.		Galv. Wrought Iron.	
	Black.	Galv.	Black.	Galv.
	Per cent.	Per cent.	Per cent.	Per cent.
¼ to ¾ inch.....	68.35	58.35	65.35	55.35
¾ inch.....	71.35	61.35	68.35	58.35
¾ to 6 inches.....	75.35	65.35	72.35	62.35
7 to 12 inches.....	69.35	59.35	66.35	56.35

Less than carloads, 12½ per cent. advance.

Cast Iron Pipe.—We reduce prices on Cast Iron Pipe to conform with quotations being made pretty generally, though this is another item on the Iron list on which it is difficult to name prices, because quotations are made in each case to fit the measure of the buyer. We quote: 4-inch Water Pipe, \$27 per gross ton, and 6-inch Water Pipe \$26, with Gas Pipe \$1 per net ton higher than the gross ton price of Water Pipe. On large inquiries there is no doubt that \$25 for 6-inch could be easily obtained.

Billets.—The demand for Forging Billets seems to be improving, particularly for car lots to forge shops in Chicago and Western centers. No tonnage on Rolling Billets

has been moved in this market as far as ascertainable. Prices remain unchanged at \$24 per gross ton for Open Hearth or Bessemer Billets for forging or rolling purposes.

Rails and Track Supplies.—Business has been quiet for the last week, neither steam nor electric railways closing purchases of any magnitude. Light Rails are particularly weak and inactive. We quote: Standard Sections, \$28; Light Sections, \$25 to \$28; Angle Bars, 1.40c. to 1.50c.; Spikes, 1.80c. to 1.90c., base; Track Bolts, 2.50c. to 2.60c., base, with Square Nuts, and 10c. to 15c. advance for Hexagon Nuts.

Merchant Steel.—Some new contracts are being placed for 500 to 1000 ton lots, but the majority of new contracts are for relatively small amounts and quick deliveries. Prices remain unchanged as follows: Open Hearth Spring Steel to the general trade, 2c. to 2.25c.; Smooth Finished Machinery Steel, 1.71½c. to 1.81½c.; Smooth Finished Tire, 1.66½c. to 1.76½c.; Sleigh Shoe, 1.51½c. to 1.61½c.; Cutter Shoe, 2.25c. to 2.35c.; Toe Calk Steel, 2.01½c. to 2.11½c.; Crucible Tool Steel, 6½c. to 8c.; Special Tool Steel, 12c. up; Shafting at 52 per cent. in car lots and 47 per cent. in less than car lots.

Old Material.—A peculiar feature of the business is that leading dealers in Old Materials give for publication lower figures than the materials can be bought for even by the largest purchasers. As a matter of fact there is little buying done except on the part of dealers, who are stocking up with a view to speculative profits on a rise that they expect. By comparing the following figures with those of last week advances will be noted of about 50c. in the following lines: Old Steel Rails, short and long lengths; Mixed Country Steel, Iron and Steel Car Axles, Nos. 1 and 2 Railroad Wrought, No. 1 Dealers' Forge, No. 1 Busheling and Wrought Pipe, Iron Axle Turnings, Soft Steel Axle Turnings, Machine Shop Turnings, Cast and Mixed Borings, Railroad and Agricultural Malleable. We quote as follows per gross ton, Chicago:

Old Iron Rails.....	\$13.00 to \$14.00
Old Steel Rails, 4 feet and over.....	11.50 to 12.00
Old Steel Rails, less than 4 feet.....	10.00 to 10.50
Heavy Relaying Rails, subject to inspection.....	23.00 to 24.00
Heavy Relaying Rails, for side tracks.....	18.00 to 20.00
Old Car Wheels.....	13.00 to 13.50
Heavy Melting Steel Scrap.....	10.00 to 10.50
Mixed Steel.....	8.00 to 9.00
Mixed Country Steel.....	8.00 to 8.50

The following quotations are per net ton:

Iron Fish Plates.....	\$12.00 to \$12.50
Iron Car Axles.....	15.25 to 16.00
Steel Car Axles.....	9.00 to 9.50
No. 1 Railroad Wrought.....	10.50 to 11.00
No. 2 Railroad Wrought.....	9.00 to 9.50
Shafting.....	13.00 to 13.50
No. 1 Dealers' Forge.....	9.00 to 9.50
No. 1 Busheling and Wrought Pipe.....	8.00 to 8.25
Iron Axle Turnings.....	8.00 to 8.50
Soft Steel Axle Turnings.....	8.00 to 8.50
Machine Shop Turnings.....	7.25 to 7.50
Cast Borings.....	4.00 to 4.50
Mixed Borings, &c.....	4.00 to 4.50
No. 1 Boilers, cut.....	8.50 to 9.00
Heavy Cast Scrap.....	10.50 to 11.50
Stove Plate and Light Cast Scrap.....	9.00 to 9.50
Railroad Malleable.....	8.50 to 9.00
Agricultural Malleable.....	8.00 to 8.50

Metals.—Pig Tin has been advancing and declining a day at a time, but the price to-day, Tuesday, is the same as reported last week—namely, 30¼c. to 30½c. per lb. in car lots. Casting Copper has advanced another ¼c., being now 13c. to 13¼c., with Lake Copper ¼c. higher. Lead is scarce and hard to get, showing another advance of at least 10c., the minimum price now being 4.30c. per lb. in 50-ton lots, with car lots at 4.35c. to 4.40c., and less than car lots at 4.40c. to 4.50c. Spelter has advanced to 4.85c. in car lots and 5.10c. in less than car lots. Sheet Zinc shows no change in price and is offered at 5.65c. per lb. in car lots of 600-lb. casks; less than car lots in 600-lb. casks, 5.85c., with the usual advances for smaller casks. Old Metals are stronger, and, with the exception of Lead, all show advances in price. Heavy Cut Copper sells at 11c., Copper Bottoms at 10¼c., Red Brass at 10¼c., Lead at 4c., and Zinc at 3¾c., spot.

Tin Plate.—The market shows increased activity, buyers evidently coming to the conclusion that prices are much more likely to go higher than lower, owing to the steady advance in the price of Pig Tin. Since the present base price of \$3.60, Pittsburgh, or \$3.79, Chicago, has taken effect, the price of Pig Tin has advanced 3c. a lb., meaning an increase in the manufacturing cost of Tin Plate averaging about 7c. per box.

Coke.—When the Frick Cokes were withdrawn from the general market in 1902 melters who have used nothing but Frick Cokes were compelled to look elsewhere. Many of these learned to their surprise that other Cokes would work quite as well as Frick for their purposes, and the Frick Company are now having difficulty in getting their old customers back into line. For the last few weeks that

company have been holding their Coke at nominally 15c. to 30c. higher than other Connellsville grades, and there is no doubt that a large number of foundrymen and other Coke users paid the premium; but there were not a sufficient number of these to give the Frick Company the tonnage they required, so the tendency now is for that company to meet competition of other high grade Cokes on even terms, it being difficult for them to get more than \$2.50 at the ovens or \$5.15, Chicago, with sales made at prices considerably less. We quote Connellsville Cokes \$2.20 to \$2.50 at the ovens, which would be \$4.85 to \$5.15, Chicago, for strictly 72-hour Foundry grades. Furnace grades are sold at about \$1.50 at the furnace, or \$4.15, Chicago, in car lots. The Coke market is weak, with buying restricted to actual current needs.

John G. Miller, 933 Marquette Building, Chicago, has been chosen as local representative of the Union Spring & Mfg. Company, succeeding the Markle Mfg. Company in that capacity.

Philadelphia.

PHILADELPHIA, PA., January 12, 1904.

The Iron and Steel situation is a difficult problem at the present time. Fairly correct statements could be presented to show that the market is better or worse, or, in other words, it is two sided. The favorable side, to use a common expression, is that "things are all right," and that the outcome will be renewed activity. That conditions are more favorable in the West and in the South than in the East is an undoubted fact, and this will go a long way toward bringing up the general average. It is also claimed that the decrease in values has no significance, as there is as much money in the country as there ever was, and that in consequence there is no necessity for depressed conditions such as now prevail. Moreover, the large corporations have such control of the situation that overproduction and cutting in prices will not be permitted. The latter statement is nearer to the truth than at any former time, but it is not wholly true, and the question of control is in some measure experimental. Further, and conceding that the control is complete, the question arises whether it will be used so judiciously that it will become permanent. The policy of maintaining prices beyond the normal is open to serious objections, and for the time being many well informed men in the trade believe that business in large volume, which would be profitable at lower prices, is kept back because of the belief that a break must come before a good upward movement can be started. Be that as it may, no one with any knowledge of prevailing conditions but will admit that there is very little business in the market at the present time. The optimistic theory may be all right, but it is not in working order. There may be as much money in the country as there ever was—there is more, in fact—but the man who bought Steel common at \$40 a share or preferred at \$85 will hardly feel that way, if he still owns it. Steel is not the only security that has depreciated. There has been a general shrinkage, and it will require a good deal of time to clear away the wreckage. That all this will be accomplished is beyond the shadow of a doubt, but it will require time, perhaps a great deal of time. At present there are no movements of any kind that warrant the expectation of quick recovery. Adjustments will be the order of the day, and the sooner they are completed the quicker will be the recovery.

Pig Iron.—The market has a very firm tone, and with stocks in an unusually small compass, holders are asking pretty full prices. It should be noted, however, that the strength of the market is due to restricted output rather than to increased demand. Reports that a number of furnaces in the Central West are to be "blown in" is a somewhat disquieting feature, although it may be some time before it is felt in this territory. But the Steel trade is not in as good shape relatively as the foundry trade is. The demand for Cast Iron Pipe and other material of that character is likely to be the largest that has ever been known. Municipal work on a large scale is seldom given out on a rising market, but it nearly always furnishes valuable support after a big decline, or after a period of prolonged depression. This feature, it is believed, will be very prominent during 1904, and will help the market for foundry grades considerably. Great interest will be manifested in the furnace report, which will, no doubt, appear in this week's issue of *The Iron Age*, and while it is expected to show further curtailment in the output, it may not affect prices to any extent. Higher prices would increase the supply and encourage Southern competition, which is already too close to be comfortable. But after all, everything will depend on the demand. If consumption shows a general increase, prices will stiffen, but with the exception of the one interest noted, prospects are not very stimulating. Compared with prices during the past three or four weeks, there is no distinct change in prices. Once in a while a low priced

lot can be picked up, but, as a rule, the range for Philadelphia and nearby deliveries, is about as follows:

No. 1 X Foundry.....	\$15.50 to \$16.00
No. 2 X Foundry.....	14.75 to 15.25
No. 2 Plain.....	14.25 to 14.50
Southern No. 2, rail shipment.....	13.75 to 14.00
Southern No. 2, on dock.....	13.00 to 13.50
Standard Gray Forge.....	13.50 to 14.00
Ordinary Gray Forge.....	12.75 to 13.25
Basic.....	to 14.00

Steel.—In a small way there is a pretty good movement, but without change in prices. No inquiries for large lots at present, as buyers are waiting for a more settled market, the impression being that if Steel Rails are reduced it will have some influence on other Steel products. Sales \$24.25 to \$25, delivered.

Plates.—Business has not started up right as yet, but some well informed people regard the outlook somewhat hopefully. Mills need work very badly, however, and it will require a tremendous lot to give them all a share. Prices are unchanged, as follows:

	Carloads. Part carloads.
	Per pound. Per pound.
	Cents. Cents.
Tank Steel, ¼ inch and heavier.....	1.75 1.80
Tank Steel, 3-16 inch.....	1.85 1.90
Tank Steel, No. 8.....	1.90 1.95
Tank Steel, No. 9 and No. 10.....	2.00 2.05
Flange or Boiler Steel.....	1.85 1.90
Marine and Commercial Fire Box Steel.....	1.95 2.00
Still Bottom Steel.....	2.05 2.10
Locomotive Fire Box Steel.....	2.25 2.30
Plates over 100 to 110 inches wide.....	\$0.05 per lb. extra.
Plates over 110 to 115 inches wide.....	.10 " "
Plates over 115 to 120 inches wide.....	.15 " "
Plates over 120 to 125 inches wide.....	.25 " "
Plates over 125 to 130 inches wide.....	.50 " "
Plates over 130 inches wide.....	1.00 " "
Sketches.....	.10 " "
Complete circles.....	.20 " "

Structural Material.—There is no special change to note at the present time. Business is quiet and inquiries for early deliveries are only for small lots. An inquiry for export brought out offers at less than 1.40c. seaboard for the usual sizes. Germany or Belgium may get the business, although it is only for a few hundred tons.

Bars.—Prices of Bar Iron show further recessions, and prices are almost anything, from 1.25c. to 1.40c., delivered. Mills that only make a few sizes have to make extremely low rates to get any business at all, but first-class Bars cannot be had at much, if anything, below 1.35c. Steel Bars less active, Refined Iron having the preference at the difference in prices.

Sheets.—There is a very fair inquiry for Sheets, and mills are getting more business than for a long time past, although prices are low and not what they should be in proportion with costs.

Old Material.—The demand is better and bid prices are almost nominal. Holders are firm and in most cases get medium or outside figures, which are about as follows for deliveries in buyers' yards:

Old Steel Rails.....	\$11.50 to \$12.00
Heavy Steel Scrap.....	11.00 to 11.50
Low Phosphorus Scrap, nominal.....	15.00 to 17.00
Old Steel Axles.....	14.00 to 15.00
Old Iron Rails.....	16.00 to 16.50
Old Iron Axles.....	15.50 to 16.00
Old Car Wheels.....	12.75 to 13.50
Choice Scrap, R. R. No. 1 Wrought.....	15.00 to 15.50
Country Scrap.....	12.00 to 13.00
Machinery Scrap.....	12.75 to 13.25
No. 2 Light Scrap.....	11.00 to 11.50
No. 2 Light (Ordinary).....	9.00 to 9.50
Wrought Turnings.....	8.50 to 9.50
Wrought Turnings, Choice Heavy.....	10.00 to 10.50
Cast Borings.....	6.25 to 6.75
Stove Plate.....	10.00 to 11.00
Wrought Iron Pipe.....	10.50 to 11.50

St. Louis.

CHEMICAL BUILDING, January 13, 1904.—(By Telegraph.)

Pig Iron.—The past week has been quiet in so far as the demand for Pig Iron is concerned, but the continued firm tone of prices is worth special remark. It has been pointed out before that the next burst of activity will be brought about when consumers' demands for second quarter's delivery begin to show, and this may be influenced most any time by the swing of prices. Perhaps a little business could be done on a slightly lower basis than \$10, Birmingham, for No. 2 Foundry grade, but it would appear that the higher figure is very generally maintained. We quote, f.o.b. St. Louis, as follows:

Southern, No. 1 Foundry.....	\$13.50 to \$13.75
Southern, No. 2 Foundry.....	13.00 to 13.25
Southern, No. 3 Foundry.....	12.50 to 12.75
Southern, No. 4 Foundry.....	12.00 to 12.25
No. 1 Soft.....	13.50 to 13.75
No. 2 Soft.....	13.00 to 13.25
Gray Forge.....	11.25 to 11.75
Southern Car Wheel.....	21.00 to 21.25

Bars.—The jobbing trade remark no change in the Bar situation and actual business is not large in volume. Prices

as before to general trade in lots from store: Iron Bars at 1.65c. and Steel Bars at 1.75c., with concessions in some directions.

Angles and Channels.—Trade has not materially increased in these lines the past week, and jobbers' quotation in lots from store remains at 2c., base.

Pig Lead.—The Lead conditions present a firmer tendency and current inquiry and sales show improvement. Nominally held at 4.20c. for Missouri brands.

Spelter.—The market is within narrow limits and prices show no pronounced tendency to advance; nominally 4.70c.

Cleveland.

CLEVELAND, OHIO, January 12, 1904.

Iron Ore.—The slackness of the Iron trade is indicated by the fact that the movement from Cleveland Ore piles to the furnace stocks during the past week was only 3500 tons. During the summer and in normal seasons during the winter the average weekly movement is 55,000 to 60,000 tons. Nothing is heard now of the fixing of Ore prices for the coming year. A meeting of the Ore association is not expected until after the middle of March at best.

Pig Iron.—While the productive capacity in the valleys has been largely reduced, the small percentage yet in operation find it necessary now and then to pile Iron. The situation this week has been very slightly improved. Some of the buyers appear to be getting over their holiday dullness and are planning to come into the market. Most of the buying now is for delivery through the first quarter of the year, the orders running fair in the aggregate but individually being small. Prices now range around \$13 in the Valleys for No. 2, variations above and below that price depending on the amount of the contract and the delivery required. We continue to quote, f.o.b. cars, Cleveland:

Northern Coke, No. 1 Foundry.....	\$14.25 to \$14.75
Northern Coke, No. 2 Foundry.....	13.75 to 14.25
Northern Coke, No. 3 Foundry.....	13.25 to 13.75
Southern Coke, No. 1 Foundry.....	14.25 to 14.50
Southern Coke, No. 2 Foundry.....	13.75 to 14.00
Southern Coke, No. 1 Soft.....	14.25 to 14.50
Southern Coke, No. 2 Soft.....	13.75 to 14.00
Jackson County, 8 per cent. Silicon.....	to 17.45
Hanging Rock Charcoal No. 1.....	to 23.45
Southern Charcoal No. 1.....	20.00 to 20.50
Lake Superior Charcoal.....	18.00 to 18.50

Not an inquiry of any importance has been heard for either Bessemer or Basic and they are hardly quotable in this market. Occasionally a carload is sold, but that does not establish a market. The Coke situation continues easy, with prices unchanged, ranging from \$2.25 to \$2.65 for good 72-hour Coke and \$2 to \$2.15 for high sulphur Cokes.

Finished Iron and Steel.—The leading interest has been in the Bar trade, where a better tone is evident, especially in Bar Iron. The trade is a little stronger, buying becoming of a more general nature. For a time it was deemed possible that concerted action would be taken on advancing the price, but this is now given over and all are content with stability at 1.30c., Youngstown. The Bar Steel trade does not show any such signs of improvement. The only activity seems to be in specification against former contracts. The Sheet trade has picked up a little. One of the reports is that the tonnage taken in Cleveland for the first ten days of this year exceeds that taken for the similar period a year ago, despite the adverse influence of the weather. Prices have held firm, because no aggressive effort has been made to move them either up or down. Quotations are 2.50c. out of stock for No. 27 Black Sheets, and 2.35c. in car lots, at the mill, for No. 27, one pass cold rolled. Galvanized Sheets out of stock are quoted 75, 10 and 2½ off list for No. 27 and lighter, while the heavier gauges are sold 75 and 10 off list. The spurt in Structural business has given way to a more moderate spirit, and the buying is modest, indeed. There are, however, some good specifications in, and also some good inquiries, which are likely to develop into contracts soon. The price holds at 1.60c., Pittsburgh. The Plate trade shows little signs of improvement. Orders are of a hand to mouth nature. The mail orders, however, are fairly heavy. The price holds, with little effort being made to break it, at 1.60c., Pittsburgh. The Rail trade has not improved any. Some of the inquiries recently received appear to have come either from roads in no financial position to complete the contract or from other lines, which have been imaginary projections for political purposes on the part of their promoters.

Old Material.—The Scrap collectors have been hampered somewhat by the snows which have prevailed all through this territory, and the tone of the market has improved. The dealers themselves have shown strength by demanding higher prices, but it can hardly be said that the same feeling has spread to the trade. Buyers are holding off. Many of the prices remain purely nominal. We revise the list and quote, all gross tons: Old Steel Rails, \$14 to \$15; Old Iron Rails, \$16; Old Car Wheels, \$13.50 to \$14; Railroad Malleable, \$12 to \$12.50; Cast Borings, \$5. All

net tons: No. 1 Railroad Wrought, \$11.50 to \$12.50; No. 1 Busheling, \$10 to \$11; Wrought Turnings, \$6 to \$6.50; Iron Car Axles, \$17 to \$18; No. 1 Cast, \$10.50 to \$11.50; Stove Plate, \$9 to \$10.

Cincinnati.

FIFTH AND MAIN STS., January 13, 1904.—(By Telegraph.)

Developments in the Pig Iron market have not as yet materialized. Very little buying has come to the surface, and conditions remain practically unchanged. Buyers as a rule are thought to be fairly well supplied for the first quarter's needs and are making few advances toward the second. Inquiries remain good, with few large transactions reported. We learned that one of our foundries has secured the contract for the 4000 tons of Iron to be used by the water works department and have purchased Gray Forge with which to fill the order. Freight rates from Hanging Rock district to Cincinnati, \$1.15, and from Birmingham, \$2.75. We quote, f.o.b. Cincinnati, as follows:

Southern Coke, No. 1.....	\$13.00 to	\$13.25
Southern Coke, No. 2.....	12.50 to	12.75
Southern Coke, No. 3.....	12.00 to	12.25
Southern Coke, No. 4.....	11.50 to	11.75
Southern Coke, No. 1 Soft.....	13.00 to	13.25
Southern Coke, No. 2 Soft.....	12.50 to	12.75
Southern Coke, Gray Forge.....	11.25 to	11.50
Southern Coke, Mottled.....	10.75 to	11.00
Ohio Silvery, No. 1.....	17.00 to	17.25
Lake Superior Coke, No. 1.....	14.65 to	15.15
Lake Superior Coke, No. 2.....	14.15 to	15.15
Lake Superior Coke, No. 3.....	13.90 to	14.90

Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	\$18.75 to	\$19.00
Lake Superior Car Wheel and Malleable.	18.75 to	19.00

Plates and Bars.—The demand for this class of material is fairly good and dealers are anticipating a steady growth. We quote, f.o.b. Cincinnati: Iron Bars, in carload lots, 1.35c., with half extras; the same in smaller lots, 1.90c., with full extras; Steel Bars, carload lots, 1.43c., with half extras; the same in smaller lots, 1.80c., with full extras; Base Angles, 1.73c. in carload lots; Beams and Channels, in carload lots, 1.73c.; Plates, ¼-inch and heavier, 1.73c. in carload lots; in smaller lots, 2c.; Sheets, 16-gauge, in carload lots, 2.05c.; in smaller lots, 2.60c.; 14-gauge, in carload lots, 1.95c.; in smaller lots, 2.50c.; Steel Tire, ¾ x 3-16 and heavier, 1.63c., in carload lots.

Old Material.—Prices for Old Material are unchanged; inquiries good, with demand more promising. We quote dealers' buying prices, f.o.b. Cincinnati, as follows: No. 1 Wrought Railroad Scrap, \$10 per net ton; No. 1 Cast Scrap, \$10 per net ton; Iron Rails, \$13 to \$14 per gross ton; Steel Rails, rolling mill lengths, \$10 per gross ton; Iron Axles, \$15 per gross ton; Car Wheels, \$11 per gross ton; Heavy Melting Scrap, \$9.75 to \$10 per gross ton; Low Phosphorus Scrap, \$11.50 to \$12 per gross ton.

Pittsburgh.

PARK BUILDING, January 13, 1904.—(By Telegraph.)

Pig Iron.—The Pig Iron market continues rather quiet. While there is a fair amount of inquiry, the general tone of the market is weak, and some low prices are being made on Northern Foundry Iron. We quote Standard Bessemer Iron at \$13 to \$13.15, Valley furnace, or \$13.85 to \$14, Pittsburgh. There is some inquiry for Basic Iron, which is held at \$12.75 to \$13, Valley furnace. Standard Northern brands of No. 2 Foundry Iron are held at \$13, Valley furnace, or \$13.85, Pittsburgh; but in exceptional cases it has sold at \$12.75, Valley furnace, or \$13.60, Pittsburgh. On a firm offer \$13, Valley furnace, would be shaded. Forge Iron continues quiet and Northern brands are held at \$12.75 to \$13, Pittsburgh.

Steel.—The amount of Steel being sold at pool prices is relatively small, and does not cut much figure in the market, the large consumers being covered by special contracts, which give them their Billets and Sheet Bars at considerably less than pool prices. Bessemer and Open Hearth Billets are \$23, and long Sheet Bars, \$24, Pittsburgh.

Coke.—While a good deal of Furnace Coke has been sold at \$1.45 to \$1.50 a ton, it is claimed this is not the best Connellsville Furnace Coke, but is made in the Klondike and other outside regions. The large Coke operators, like the Frick Coke Company, Oliver & Snyder Coke Company, Hecla Coke Company and others, whose ovens are in the old Connellsville region, are said to be holding strictly Connellsville Furnace Coke at \$1.65 to \$1.75 a ton.

Iron and Steel Scrap.—Receivers of the Clairton Steel Company have bought 10,000 tons of Heavy Melting Stock, the Sharon Steel Hoop Company 15,000 to 25,000 tons and other large Steel interests are in the market for a heavy tonnage of the same class of material. The price of Heavy Melting Stock has advanced squarely to \$12.50 to \$13 a ton, Pittsburgh. Other kinds of Scrap are firmer, and the market on Old Material is in better shape than for some time.

(By Mail.)

The Steel Scrap trade in the Pittsburgh district has changed very radically in the past week, a large number of inquiries being in the market and a good deal of tonnage, 25,000 to 30,000 tons, having already been sold. The price of Heavy Melting Stock has advanced from \$11 to \$12.50 in gross tons, while some dealers quote \$13 to \$13.50. The receivers of the Clairton Steel Company have bought about 6000 tons at \$12.50, Pittsburgh, and are in the market for more. The Carnegie Steel Company have also bought and are negotiating for additional tonnage. The upward movement in Scrap is expected to materially benefit the Pig Iron market. For some time Open Hearth plants have been using as high as 60 per cent. and more of Scrap on account of it being lower in price than Bessemer Iron, which has naturally decreased demand for the latter.

As the result of a circular letter sent out on January 1 by J. G. Butler, Jr., of the Bessemer Furnace Association, it was learned that the condition of the blast furnaces East and West, on January 1, was as follows:

1. In the East about 50 per cent. of the capacity is in blast; the remaining 50 per cent. is out of blast, by reason of the market price being unremunerative and for lack of demand.

2. The Mahoning and Shenango valleys show a total idle capacity of 72 per cent.

3. Out of the 102 idle furnaces, two furnaces report that they will resume in January.

4. Eight furnaces report that they will resume in February.

5. Nineteen furnaces report uncertain as to resumption.

6. Seventy-two reports indefinite as to resumption.

7. One furnace reports will resume within 90 days.

8. On January 1, 1904, out of 156 furnaces tributary to the Lake Superior Ore region, including Johnstown, Pittsburgh, Wheeling, the Mahoning and Shenango valleys, Cleveland, Columbus and Southern Ohio districts, with an average daily capacity of 37,000 tons, or an annual capacity of 13,000,000 tons; 53 stacks were in blast and 102 out of blast; the idle capacity being 65 per cent.

The Iron trade continues very quiet and some apprehension is felt as to the future. While it is true there is more inquiry and perhaps a slight increase in tonnage, yet the undertone of the market is not strong as desired, and concessions in prices of most lines of material not controlled by price agreements are readily obtainable. The Pig Iron market is quiet and Bessemer Iron has declined squarely to \$13, at Valley furnace, with very little doing. Gray Forge and Foundry Iron are quiet, but fairly firm in price. A relatively small amount of new tonnage is being placed in Billets and Sheet Bars, as consumers are going very slow. On some lines of Finished Iron and Steel tonnage is improving to some extent, but is very far short of being large enough to give the mills full work. The Coke trade is especially depressed and Coke makers have abandoned the scheme of a Central Selling Agency to control prices and output. Connellsville Furnace Coke has sold in exceptional cases as low as \$1.45 a ton for prompt shipment, but the larger dealers are holding their product at \$1.60 to \$1.65 a ton.

Sheets.—In the past week some large inquiries for Sheets have come in the market, and considerable tonnage has been sold for delivery up to July 1. A good deal of business is under negotiation and will likely be closed within the next week. It would seem that the Sheet trade is about to get out of a rut in which it has been for so long, and while prices are no higher, the tone of the market is firmer. We quote Black Sheets, box annealed, one pass through cold rolls, as follows: Gauges 18 and 20, 2.05c. to 2.10c.; 22 and 24, 2.10c. to 2.15c.; 26, 2.15 to 2.20c.; 27, 2.20c. and 2.25c.; 28, 2.30c. to 2.35c.; 29, 2.45c. to 2.50c.; 30, 2.55c. to 2.60c. These prices are for carloads and larger lots, f.o.b. maker's mill. Galvanized Sheets are quoted at 80 and 2½ per cent. off in carloads, but for very nice specifications it is possible that some mills might name 80 and 5 per cent. off.

Structural Material.—About the only large work on the market at present in a highway bridge at Cambridge, Mass., involving 8000 to 10,000 tons, on which the principal bridge concerns are now bidding. A number of small jobs are being placed, but the Structural mills and the shops are only fairly busy. There is some unevenness in prices of small Angles, a number of outside mills rolling these and selling them at comparatively low prices. We quote: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c.

Plates.—Taking effect January 1, prices on Plates are based on 1.60c., Pittsburgh, plus actual freight to point of destination. Heretofore in some cases the mills absorbed part of the freight, but under the new arrangement full tariff rates are charged. The demand for Plates is a little better and there is prospect of some business from the Steel car interests before long, as a number of fair sized orders for cars have recently been closed. The general trade con-

tinues to place orders for Plates only for actual needs, refusing to contract ahead. We quote: Tank Plate, $\frac{1}{4}$ -inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine Ordinary Fire Box, American Boiler Manufacturers' Association specifications, 1.80c.; Still Bottom Steel, 1.90c.; Locomotive Fire Box, not less than 2.10c., and it ranges in price up to 3c. Plates more than 100 inches in width, 5c. extra per 100 lbs. Plates 3-16 inch in thickness, \$2 extra; gauge Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. These quotations are based on carload lots, with 5c. extra for less than carload lots; terms net cash in 30 days.

Muck Bar.—The market is quiet and we quote Standard grades of domestic Muck Bar at \$24.50 to \$25, Pittsburgh.

Ferromanganese.—There is very little doing, and we quote 80 per cent. Ferro at \$45 to \$46 in large lots. For carloads and smaller lots \$46 to \$47 is quoted.

Steel Rails.—Some desirable tonnage for delivery in Canada has been placed and a good deal of business for export is under negotiation. Domestic tonnage is light, but there is some inquiry for Light Rails, on which some comparatively low prices are being made. The movement to have a meeting of Light Rail manufacturers seems to have fallen through. We quote Standard Sections at \$28 at mill.

Iron and Steel Bars.—There is a better inquiry for Iron and Steel Bars, and some tonnage is expected to be placed by the car interests, which have recently taken some fair sized orders for cars. However, buyers continue to limit their purchases to actual needs and as a rule refuse to contract. We quote Iron Bars in carloads at 1.30c., Youngstown, or 1.34 $\frac{1}{2}$ c., Pittsburgh. For very desirable specifications and for a large contract it is possible this price might be slightly shaded. We quote Steel Bars at 1.30c., Pittsburgh, in carloads and larger lots. For quantities less than 2000 lbs. and not less than 1000 lbs. the price is 1.40c., and for less than 1000 lbs. the price is 1.50c.

Tin Plate.—Some fair sized contracts for Tin Plate have been placed and considerable business is under negotiation. We quote 100-lb. Cokes at \$3.60, Pittsburgh.

Wire Rods.—We continue to quote Bessemer and Open Hearth Rods at \$30, Pittsburgh, but on a firm offer this might be slightly shaded.

Spelter.—The market is fairly firm and prime grades of Western Spelter are held at 4.70c. to 4.75c., for prompt delivery.

Railroad Spikes.—This trade is a little quiet just now and we quote on the basis of \$1.85 per 100 lbs.

Merchant Steel.—A fair amount of new tonnage is being entered, and implement makers are expected to specify liberally this month, as it is known their stocks are very low. We quote: Tire Steel, 1.50c., base, for usual sizes; Toe Calk, 1.85c., base; Sleigh Shoe Steel, 1.45c. to 1.50c.; Open Hearth Spring, 1.90c. to 2c.; Cutter Shoes, tapered and bent, 2.25c. The above prices are for carload lots at mill, the usual differentials being charged for small lots. Tool Steel is 6c. to 8c. for ordinary grades. Prices on Shafting are firm on the basis of 52 per cent. off in carloads and 47 per cent. in less than carloads, delivered in base territory.

Skelp.—The market is quiet and we do not hear of any sales. Grooved and Sheared Iron Skelp is held at 1.50c., Pittsburgh.

Merchant Pipe.—The demand for the smaller sizes of Pipe is dull, but is very good on 6-inch and larger, and on the larger sizes the mills are pretty well filled up for several months. The independent Pipe mills have issued a new schedule of prices similar to that issued last week by the leading interest. Discounts to consumers in carloads are as follows:

	Steel.		Iron.	
	Black. Galvanized.	Black. Galvanized.	Black. Galvanized.	Black. Galvanized.
$\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{8}$ inch.....	70	60	67	57
$\frac{1}{2}$ inch.....	73	63	70	60
$\frac{3}{4}$ to 6 inches.....	77	67	74	64
7 to 12 inches.....	71	61	68	58
Extra Strong, Plain Ends:				
$\frac{1}{2}$ to 8 inches.....	69	59	65	55
Double Extra Strong, Plain Ends:				
$\frac{1}{2}$ to 8 inches.....	61	51	57	47

Boiler Tubes.—The demand is quiet, as it usually is at this season of the year. Discounts to consumers in carloads are as follows:

	Steel.	Iron.
1 to $1\frac{1}{4}$ inches.....	42 $\frac{1}{2}$	39
$1\frac{1}{4}$ to $2\frac{1}{4}$ inches.....	55 $\frac{1}{2}$	38
$2\frac{1}{4}$ inches.....	58	43
$2\frac{1}{2}$ to 5 inches.....	64 $\frac{1}{2}$	50 $\frac{1}{2}$
6 to 12 inches.....	55 $\frac{1}{2}$	38

Coke.—The Coke trade is very dull and furnaces are holding off placing contracts in the belief that prices will be lower. Strictly Connellsville Furnace Coke is held at about \$1.60 at oven, but outside makes of Furnace Coke are selling as low as \$1.40 to \$1.50 a ton at oven. Connellsville 72-hour Foundry Coke is held at \$2.25 to \$2.50 a ton, while Main Line Foundry Coke is selling at \$2 a ton

and lower. Out of about 23,000 ovens in the Upper and Lower Connellsville regions, more than half of these are idle, and output is only about 100,000 tons a week. Shipments, too, are very light, and the immediate outlook for the Coke trade is not very bright.

The New York Machinery Market.

NEW YORK, January 13, 1904.

Evidences of a better tone are to be noted in all branches of the machinery trade. In some lines this has crystallized into orders, but, considering the trade collectively, it is chiefly due to marked increase in inquiry. An officer of one of the very large machine tool houses, in speaking of the improvement in inquiries both as to number and tone, referred to several which commenced something like this: "We are now in a position to take up the matter of equipment which we had under advisement last spring." Indications of this sort are, of course, of the best, and from present appearances a good many latent propositions will soon be stirred into renewed activity. No exceptionally large orders were reported during the week. About the largest was for machine tools and supplies, and was placed by Frank Klepelko of 8 Bridge street, New York. It amounted to about \$20,000, the materials being intended for the new plant of the Cerro de Pasco Mining Company. It will be recalled that this company, in which J. B. Haggin, the Pacific Coast capitalist, is the principal financial supporter, are rejuvenating an ancient copper property at Cerro de Pasco, Peru.

The lathe building contingent of the National Machine Tool Builders' Association met in New York last week to discuss a phase of the price question which recently was forced upon them. As a result of their conference they have a better understanding regarding prices, and the lists of the various members are relatively more uniform than they were. The meeting was held in executive session, and no information was given out for publication at its close. It appears that an agent for one of the concerns represented on his own responsibility cut prices on a certain transaction 15 per cent. below those which should have been named according to the machine tool builders' agreement. Word of it leaked out and last week's meeting was called. One prominent lathe builder came to the meeting with a strong argument in favor of decreasing prices all around, claiming that all lathe prices were too high for the present conditions of business. He referred to the handicap under which his concern were working in accordance with the agreement, in view of the lower prices allowed to one of the other members of the association. He lost his point, however, and instead of a general decrease to conform to the prices of the low man, the latter was induced to advance his prices to bring his line upon a more equitable footing with the other members. The lathe builders, we understand, also agreed to furnish each other with their full line of prices.

The machine tool trade are showing considerable interest in the project looking toward the establishment of an immense gun factory by the Navy Department. A full report on this subject is printed in another column of this issue.

Another interesting subject, on which we print a special report from Washington, is the progress making for the adoption of the steam turbine for the propulsion of naval vessels.

A report coming from Philadelphia to-day states that it is not improbable that the Pennsylvania Railway Company will reject the bids submitted on December 15 by various contractors for the construction of the tunnels under the East and North rivers in connection with its great New York terminal. Such action was foreshadowed in *The Iron Age* shortly after the bids had been opened, and now that sufficient time has elapsed to thoroughly examine these bids it has developed that, as a rule, they are not satisfactory to President Cassatt or to the engineering commission which supervised the preparations of the plans and specifications and which will supervise the work of construction. While reticence is maintained by the officials of the company and the members of the engineering commission, it has been learned that some of the bids submitted were considerably higher than the estimate of the commission. Others were not in accordance with the specifications, the bids in some instances being based upon specifications or ideas of the bidders. Whether new bids will be called for or the company will perform the work themselves is still a matter of conjecture.

The Pittsburgh, Ft. Wayne & Chicago Division of the Pennsylvania Railroad are improving their buildings and adding to the equipment of their shops at Steubenville, Ohio. Much of the locomotive repair work heretofore taken care of at the Dennison repair shops will be done at Steubenville.

Announcement has been made at the headquarters of the Hocking Valley Railroad at Columbus that the company will install an electrical plant at Toledo and will utilize electrical equipment throughout on the Toledo docks for the trimming of coal and handling of ore. The new machinery will replace

a large amount of hand labor and will greatly reduce the cost of operation.

The projected hydraulic development on the St. Louis River, near Duluth, Minn., by the Great Northern Power Company, of that city, has come to a head, and the company are now ready to receive bids for the mechanical equipment. The company have sent to the trade proposals to furnish three 12,500 horse-power turbines, with vertical shafts to operate under a head of 365 feet at 250 revolutions per minute, together with exciter turbines, governors and other hydraulic apparatus. Construction work will be begun in the spring, and it is expected to have the 30,000 horse-power plant in operation some time in the fall of 1905. Provision has been made for increasing the development at any time, and it is intended to increase the installation ultimately to 80,000 horse-power. This station will furnish power to operate street railways, lighting and manufacturing concerns in Duluth and Superior, and for the iron mines on the Mesaba range. The office of the company is in the Providence Building, and F. A. Cokefair is chief engineer.

By early spring the Ajax Portland Cement Company will be in the market for a complete equipment for a large cement plant they intend to erect at Pattenburg, N. J. The company were incorporated this week with a capital stock of \$2,000,000, half 8 per cent. preferred and half common stock, and will start soon to prepare plans for the buildings. In the vicinity of Pattenburg they have purchased 200 acres of land, and will erect a 1200-barrel plant, starting work in the spring with the expectation of having the plant in operation in the fall. It will be equipped with the most modern machinery, and will probably be operated by electricity. While water power is available on the property it is thought that this will not be of sufficient power to operate the plant, and a steam plant will have to be installed. The incorporators are Hiram C. Bennett, Edward H. Bennett and H. B. Starrett, all connected with H. C. Bennett & Co., 18 Wall street, New York, which is also the present address of the Ajax Company.

In about a month's time the trade can expect to begin to book orders for the new plant of the United Lead Company at Granite City, Ill. The company are now at work on the specifications, which are to include not only a modernized duplicate of the equipment of the Hoyt Metal Works, who are to occupy the first group of buildings, but also that for the white lead, sheet and pipe departments, and it is thought that the entire equipment will be purchased at the same time. We are informed that the specifications will be completed in about four weeks. The buildings now in course of construction include one 50 x 200 feet, one 50 x 300 feet, and one 150 x 200 feet. Following these the buildings for the sheet, pipe and white lead works will be erected. E. R. Hoyt, vice-president of the United Lead Company, 71 Broadway, New York, has the matter in charge.

The Brown Corliss Engine Company of Corliss, Wis., have received an order from the Passaic Steel Company of Paterson, N. J., for a 24 x 44 x 36 inch tandem rolling mill engine.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until January 19 for the Naval Academy, Annapolis, Md., for one 14-inch screw cutting lathe, with 12-foot bed, and a universal saw bench, 36 x 44 inches.

On January 30 the Navy Department will open bids for the construction of a concrete and granite dry dock at the New York Navy Yard, the general dimensions of which will be as follows:

"Elevation of mean high water, 95.031 feet; elevation of mean low water, 90.365 feet; length from outside of dock at head to end of apron on center line, 590 feet 8 inches; length from head (inside of coping) to sill, 571 feet; length on floor from head to sill, 550 feet; width of entrance at coping (least), 90 feet; width of entrance at mean high water (least), 90 feet; width inside coping in body of dock, 132 feet; width of floor between faces of bottom altars, 90 feet; depth from coping level to mean high water, 5 feet 8 inches; elevations of coping, 100.698 feet; depth from coping level to floor at head, 38 feet 8 inches; elevation of floor at head, 62.031 feet; greatest depth from coping level to floor in body, 39 feet 8 inches; depth over sill at mean high water, 31 feet; depth over keel blocks at mean high water, greatest, 30 feet 6 inches; depth over keel blocks at mean high water, least, 29 feet 6 inches; fall on center line of floor from plane of abutment to center line of culvert, 13.32 inch; fall on center line of floor from head of dock to center line of culvert, 1 foot; fall from foot of lower altar at sides to a point 8 feet from the center line of dock, 4 inches.

"Approaches—Distance apart at coping level at end of apron, 9 feet 6½ inches; length of east approach, about 103 feet 8 inches; length of west approach, about 139 feet 2 inches; distance from coping to mean high water, 5 feet 8 inches."

On February 4 the property of the Eddystone Foundry & Machine Company of Eddystone, Pa., will be exposed for public sale. The machinery equipment to be disposed of includes: Machine Shop: One 48-inch, four 42-inch and two

18-inch modern roll lathes; one 5 x 5 x 20 foot planer; one 6-foot boring mill; one 5-foot radial drill; one horizontal boring mill; one Newton butt slotter, with independent motor; 32, 25 and 24 inch engine lathes; 2 x 2 x 6 foot planer; electrical portable drill, drill presses, bolt cutter, power grinders and grindstone. Also a large number of tools for all the above machines; together with drills, taps, dies, chisels and fixtures for all kinds of roll turning. Foundry: One 30-ton and one 20-ton electric traveling crane of 55 feet span, both built by Pawling & Harnischfeger; one 20-ton and one 10-ton air furnace, complete with stacks; one 48-inch cupola; three core ovens, about 17 x 25 x 15 feet inside; 18 ladles of various sizes from 25-tons capacity and down; 65 tons of chills and flasks for making chilled rolls; 125 tons of flasks for making sand rolls and an enormous quantity of miscellaneous fixtures suitable for any class of foundry business. Pattern Shop: Rip saws, band saws, 20-inch lathe, with facing attachment and some hand tools suitable for repair work and light manufacturing. Power House: One 20 x 20 Harrisburg four-valve engine, direct connected to main shafting, making 200 revolutions per minute; two 150 horse-power Berry vertical safety boilers; one 150-kw. Crocker-Wheeler generator; one two-panel switchboard, fully supplied with switches and instruments; one Ingersoll-Sergeant belted air compressor and tank; one positive pressure blower for supplying the 48-inch cupola; one Cochran feed water heater; one Smith-Vaile outside packed plunger pump, blow off tank, valves and piping. Miscellaneous: Complete tools and fixtures for the blacksmith shop; sundry electric motors; a 40-foot power scrap iron breaker, with engine and boiler complete; one 50-ton track scale; one 30-ton platform scale, crane and hand scales. Electric wiring throughout the works, including a switch of 15 horse-power capacity on each column in the machine shop and piping to carry compressed air at 80 pounds to every part of the foundry; pneumatic stock elevator at cupola platform; connections and valves between blower and cupola; roll casting pit; fixtures for core room, &c.

The Payne Engineering Company announce that they have completed arrangements whereby they will assume the management of the Western business of the Ashcroft Mfg. Company, the Hayden & Derby Mfg. Company, the Hancock Inspirator Company, and the Consolidated Safety Valve Company, the business to be in charge of H. S. Whitney and M. A. Hudson. They also announce that their New York office will be in charge of W. S. Montgomery, who succeeds Messrs. Whitney and Hudson. The New York offices will be located at 26 Cortlandt street.

The Power & Mining Machinery Company, New York City, a corporation formed by the merging of the Loomis-Pettibone Gas Machinery Company and the Holthoff Machinery Company, Milwaukee, Wis., have established branch offices as follows: At Boston, Mass., in the Mutual State Building, F. P. Thorpe, manager; Pittsburgh, in the Farmers' Bank Building, H. P. Childs, manager, and at Chicago, in the First National Bank Building, Wilson and Bullington, representatives.

Request for Catalogues.—The Washburn Shops, Worcester Polytechnic Institute, Worcester, Mass., are arranging a very complete catalogue file for reference to be used by the students and instructors in mechanical engineering, as well as for the commercial purposes of the shops. Each catalogue is to be indexed under the manufacturer's name, and its contents cross-indexed according to the various subjects treated.

The Pittsburgh Coal Company.—PITTSBURGH, PA., January 13, 1904.—By unanimous vote of the directors of the Pittsburgh Coal Company at a meeting held in Pittsburgh on Tuesday, January 12, the company were financed by a contract with the Union Trust Company of Pittsburgh for the purchase and sale of \$25,000,000 50-year 5 per cent. bonds, to be used as required for indebtedness and working capital. A script dividend of 1¼ per cent. on the preferred stock was declared, payable in one year from January 25, 1904, or at the pleasure of the company, bearing interest at the rate of 6 per cent. until paid. It is stated that this loan of \$25,000,000 will be sufficient to care for all the floating indebtedness of the Pittsburgh Coal Company, as well as the obligations assumed in the taking over of the control of the Monongahela River Consolidated Coal & Coke Company, and will provide ample capital for the carrying on of operations as well.

The Pennsylvania Engineering Works, New Castle, Pa., builders of blast furnace and steel plant construction, have reduced skilled labor about 5 per cent. and common labor about 10 per cent., but are still paying common labor slightly higher wages than prevail in other plants in the New Castle district.

Birmingham.

BIRMINGHAM, ALA., January 11, 1904.

While the market the past week could not be called active, it yet lost nothing of its strength. The price of \$10 for Iron, base grade, being No. 2 Foundry, to which it was advanced the preceding week, was, generally, maintained, and in a few cases higher prices prevailed, as \$10.50 was obtained, but in a very limited way. The sales, in volume, were insignificant and were not considered of any consequence. The bulk of the sales were on the basis of \$10 for No. 2 Foundry, and this prevailed during the entire week. Sales sheets of some interests were tendered to the inspection of your correspondent to verify reports, and there can be no doubt of their genuineness. There were a few lots of 1000 tons each sold on this basis, but the majority of the sales were of lots from 100 to 500 and 600 tons. Scattered among the sales were some lots of No. 1 Foundry at \$10.75 and some No. 1 Soft at \$10.50. No. 2 Soft and No. 2 Foundry are both \$10, with No. 3 Foundry held at \$9.50. The demand was limited, but there was a good feeling for soft spots. No vulnerable places were reported. The demand was erratic, as one interest would be favored with orders while a neighbor would be left out entirely. The business of some was fully equal to output, while that of others was almost nil. Eastern buyers came in to a moderate extent, but the West and the South were most prominent. Basic Iron was very quiet, and only limited lots could be obtained, as the requirements of the Steel mill will be, when in running order, sufficient to absorb most of the output. Shipments are free and one hears but little now of complaints of car scarcity. The weather has very much favored shippers so far.

Stocks have been depleted to a material extent, and in some cases the stock on hand is covered by a few hundred tons. Some of the leading interests can yet count their stock by the thousand tons, but the amount on hand, unsold, is insignificant. It is not likely to be materially greater. A strong feeling that better prices will prevail yet obtains, but no one desires any rapid or undue advance, and the consensus of belief is that about \$12 will mark the limit of the advance anticipated.

There were a few sales made that ended in the Warrant yards, where the Iron will be held for a profit. There was insignificant inquiry for Warrants, but none are being offered, and the amount issued covers but a small volume of Iron. There have been, in the vast volume of business transacted in Iron, since October, but few, comparatively speaking, speculative sales. The great bulk of the sales was for consumptive account. This would or should stamp the trade as healthy. There was some inquiry for Iron for delivery in second quarter, and some prices were reluctantly made at an advance over current values. If transactions followed they have been withheld. As is well understood in the trade, business in Iron at this season of the year is usually very light, and a lull in the demand, therefore, excites no surprise.

We are, as yet, gaining nothing in output. Increased output will come with increased values. The latter are necessary if profits are to be reaped.

Another meeting of the furnace interests has been called to convene here to-morrow to consider a plan matured by their selected committee for the furtherance of their mutual interests. It will, if adopted, make some radical changes in the conduct of the Iron business. It is a very hard matter to bring strong competitive interests into harmonious action. What one sees is for their best mutual interests meets the disapproval of others. Dissatisfaction is easily bred and dissention quickly follows. Then one breaks away and the dissolution becomes the grave of buried hopes. The plan contemplates the unification of interests as to uniformity of action. To be successful, all the interests must accept it. There are as yet influential interests strongly opposed to the plan, and those who favor it are now endeavoring to smooth away their objections. If it fails of adoption this time the attempt "to get together" will probably be abandoned. It is contended that if but a tithe of the time and thought that are commanded by the manufacturing end of the Iron business was devoted to the same end in view the regulation of sales and the distribution of the output could be so managed that the most objectionable features of the business that are the outgrowth of the methods in vogue could be greatly modified and some could be obliterated.

At the Steel mill affairs are quiet, pending the settlement of the scale of wages. At the beginning of the year notice of a reduction of wages was posted involving all to whom over \$1 per day was paid. The reduction was about 15 per cent. At first it was supposed it would lead to no serious interruption of business, the acceptance of the cut being anticipated. But the men refused to accept the reduction and walked out. There was no lockout. There was no strike. But there was a walk out. These be technical differences, but all lead to the same end, cessation of operations. Each side, so far, are firm in their position and declare they will so remain. There are reports of differences

at a few other points in the district that may lead to similar conditions, but it is not good form to cross a bridge before you get to it. What may be, and what is, are two different propositions.

The Birmingham Stove & Hardware Company filed articles of incorporation the past week. They are capitalized at \$100,000 and are controlled by local parties.

The Eclipse Rolling Mill Company have let the contract for the erection of their buildings, which are to cost \$35,000 and be completed in 60 days. They will make Shapes, Harness Buckles, Wrought Iron and Steel Washers, Tap and Set Screws, and make a specialty of Galvanizing.

There is another deal in Coal lands reported as about completed. They are situated in Walker County and involve about 15,000 acres. The consideration is stated to be \$450,000, and the purchaser, though keeping in the background as to identity, is said to be affiliated with the Steel Trust. The same source has been conspicuous in deals mentioned heretofore.

The production of coal in this State for 1903 is officially estimated at 12,000,000 tons, which shows an increase of 1,000,000 tons over the output of 1902. The daily shipments of Coal continue heavy and the demand for prompt delivery is taxing ability to supply.

Some new enterprises are being agitated with the prospect of successful realization. The outlook as a whole tends to the growth of confidence.

PERSONAL.

P. Eyermann, consulting metallurgical engineer, has removed his office from Cleveland, O., to St. Louis. He has been appointed superintendent of various motors, group 63 of the Louisiana Purchase Exposition.

R. R. Howells has been appointed superintendent of the Girard Works of the Carnegie Steel Company, at Girard, Ohio.

The Traffic Club of Pittsburgh gave a complimentary dinner on Wednesday evening, January 6, to George E. McCague, recently traffic manager of the Carnegie Steel Company, but who resigned. Mr. McCague was active in the formation of this organization.

L. C. Bihler has been appointed traffic manager of the Carnegie Steel Company, at Pittsburgh, succeeding George E. McCague, who recently resigned.

Henry W. Oliver, of Pittsburgh, has been seriously ill for a month or more with kidney trouble. He is confined to bed, in constant care of a trained nurse, and his condition is regarded as critical.

Llewellyn H. Vinnedge, office manager of the American Steel & Wire Company, Anderson, Ind., has been missing since December 31. F. A. Mower, of the general offices, has been placed in charge.

Captain John Pengilly, who has spent 23 years of active life in the mines of the Lake Superior region, has resigned from his position as manager of the Chandler mine of the Chandler Iron Company, at Ely, Minn., and of the Soudan mine of the Minnesota Iron Company, at Soudan, Minn., and will remove with his family to his farm at Northfield, Minn., to secure a much needed rest.

Charles R. Robinson, widely known in iron and steel circles in Chicago and the West, has accepted the position of manager of sales with the Inland Steel Company, Chicago.

Irving H. Reynolds, formerly with the Allis-Chalmers Company, and for many years in charge of their pumping engine department, has accepted a position with the William Tod Company of Youngstown as consulting engineer, and is in charge of the department devoted to the building of large high duty crank and fly wheel pumps, giving most of his attention to this branch of the business.

Charles H. Norton, of the Norton Grinding Company of Worcester, Mass., sailed for Europe yesterday in the interest of his company. He will pass several weeks in Germany and England, visiting the various iron and steel centers.

N. S. Braden, formerly manager of the Westinghouse Electric & Mfg. Company's district office at Cleveland has been appointed sales manager of the new Canadian Westinghouse Company, Ltd., and assumed the duties of that office on January 1, 1904. Mr. Braden succeeds the late Thomas C. Frenyear. Mr. Frenyear's office was at

Toronto, but Mr. Braden will make his headquarters at Hamilton, Ontario.

Benjamin Wrightson Head has been admitted to the firm of Jeremiah Head & Son, consulting engineers of Westminster, London.

Joseph D. Fraser has been appointed assistant of Graham Fraser, general manager of the Dominion Iron & Steel Company, at Sydney, Nova Scotia.

David Baker has resigned as general manager of the Dominion Iron & Steel Company, at Sydney, Nova Scotia.

O. W. Kennedy, formerly general superintendent of the H. C. Frick Coke Company and allied fuel interests of the United States Steel Corporation, has resigned his position, effective February 1, after continuous employment with this concern for 14 years. Mr. Kennedy expects to go South for an extended visit for recuperation.

William J. Stoop, formerly of the Sharon plant of the Carnegie Steel Company, at Sharon, Pa., has been transferred to the Donora plant of the United States Steel Corporation, at Donora, Pa.

George M. Hunter, who has been manager of the Hazleton works of the American Bridge Works, at Hazleton, Ohio, has been made assistant manager of the Ambridge plant, at Ambridge, Pa. J. M. Boyle succeeds him as manager of the Hazleton works.

Otis H. Cutler, formerly first vice-president and general manager of the American Brake Shoe & Foundry Company, Mahwah, N. J., has been elected president of that company, succeeding W. D. Sargent, who resigned. J. D. Gallagher, formerly second vice-president, succeeds Mr. Cutler as first vice-president and general manager, and J. B. Terbell, who was general sales manager, has become second vice-president.

H. H. Barbour, formerly of Chicago, has been placed in charge of the sales department for structural material of the Lackawanna Steel Company, with headquarters at New York.

John Millhiser, one of the representatives of the Westinghouse Air Brake Company, at Wilmerding, Pa., has resigned, and will make a long tour through the South and West.

W. H. Clingerman will probably succeed O. W. Kennedy as general superintendent of the plants of the H. C. Frick Coke Company and allied fuel interests. Mr. Clingerman has been assistant superintendent for some years.

Gibson D. Packer, formerly general solicitor of the Carnegie Steel Company, at Pittsburgh, has resigned, and will enter upon general law practice in that city. Mr. Packer was connected with the legal department of the Carnegie Steel Company for 15 years.

P. E. Donner, formerly manager of the Monessen works of the American Sheet & Tin Plate Company, at Monessen, Pa., will be a candidate for the Republican nomination for Congress for the Twenty-first District, comprising Westmoreland and Butler Counties.

The Engineers' Society of Western Pennsylvania.

The annual meeting of the Engineers' Society of Western Pennsylvania was held in Pittsburgh last week, at which reports for 1903 were read. Last January the society had 588 members, but now has 870 members, and expects to increase this number to 1000 or more before this year is out. The following officers were elected: James M. Camp, president; Samuel Diescher, first vice-president; G. E. Flanagan, second vice-president; A. E. Frost, treasurer, and Charles W. Ridinger, secretary. This society now has over \$3000 in the treasury, and is in a very prosperous condition generally.

At the bi-monthly wage conference held at Youngstown, Ohio, on January 11, between representatives of the Amalgamated Association and representatives of the labor bureaus of the Republic Iron & Steel Company and Carnegie Steel Company, the rate for puddling was reduced from \$5.75 to \$5.25 a ton. Bar mill heating and finishing was reduced about 4 per cent. It was found that the average price of iron bars shipped in November and

December was about 1.30 cents and under the sliding scale this necessitates the above reductions in wages.

Trade Publications.

Telpherage Transportation.—The United Telpherage Company, Westfield, N. J., in their circulars Nos. 37, 38 and 42, describe the application of their system of automatic cable haulage to overhead transportation of freight by cable lines, automatic telpherage upon fixed overhead tracks, and in handling coal, coke, ashes, &c., for power plants in general. These circulars are standard size, 6 x 9 inches.

Industrial Betterment Reports.—Dodge & Day, Philadelphia, have issued a 6 x 9 inch pamphlet setting forth the nature of the business conducted by them in the publication and distribution of their Betterment Reports for the guidance and assistance of works managers in modernization of their industrial methods.

Disk Water Meters.—The Henry W. Worthington Company, 116 Liberty street, New York, are distributing a standard size, 3½ x 6 inch, pamphlet of eight pages, relative to their new disk pattern water meter. The pamphlet is printed upon light cardboard, differing in this respect from the common practice in publications of similar nature.

Traveling Cranes.—A 9½ x 6 inch catalogue of 18 pages, devoted to Anderson's power traveling crane, as made by the Lane Mfg. Company, Montpelier, Vt. The Anderson crane is rope driven and involves in its trolley mechanism the use of paper and iron bevel friction gearing, driving the hoist through worm gearing running in a bath of lubricant. The crane is designed for use in shops where electric power is not available.

Fire Proof Building Material.—A standard size, 6 x 9 inch catalogue of 32 pages, giving publicity to the merits of Ferroinclave, the new steel and concrete fire proof construction for roofing, siding, flooring, &c. It is designed for use not only in manufacturing shops and warehouses, but also for various details in buildings of a more general nature. The pamphlet is profusely illustrated and shows a wide variety of applicability for the new material.

Gas Engines.—Two 9 x 6 inch, standard size, pamphlet catalogues sent out by the Woolley Foundry & Machine Works of Anderson, Ind. These are catalogues G and H, the former dealing more particularly with the Burger gas engines and the Field pumping powers, while the latter and larger pamphlet goes into greater detail relative to the Burger gas engine, its construction, operation and fields of application.

Seamless Pressed Steel Tanks.—A standard size, 9 x 6 inch, 26-page pamphlet catalogue, illustrating the tanks, shells, cylinders, &c., made from seamless pressed and drawn steel by the Pressed Steel Tank Company, Milwaukee, Wis. This is the company's catalogue A, which introduces this company's product to the trade. It is very finely illustrated and shows a large number of types of vessels manufactured by the company's new process. Included in the line are a seamless steel range boiler, and similarly constructed steel barrels, milk cans, ammonia cylinders, &c.

Saw Mill Machinery.—Catalogue D of the Diamond Iron Works, Minneapolis, Minn., standard size, 6 x 9 inches, 226 pages. This is a most creditable publication, showing a very complete line of distinctively saw mill equipment, and including an extensive line of general power transmission machinery and appliances. The catalogue concludes with several pages of tabular data of engineering value, as well as a comprehensive index.

Sprocket Chains.—General catalogue No. 2 of the Michigan Sprocket Chain Company, Limited, Detroit, Mich., standard size, 6 x 9 inches, 128 pages. The catalogue shows an apparently complete line of sprocket chains of various types, with attachments, &c. Clutches, pulleys, take-ups and general elevating and conveyor equipment are also briefly treated.

Steam Superheater.—A standard size, 6 x 9 inch, 16-page pamphlet relating to superheated steam and the Foster superheater, as made by the Power Specialty Company, 126 Liberty street, New York. Interest on the subject of superheated steam is rapidly growing, and this catalogue is one of a second edition required by the early exhaustion of a large previous edition.

De Camp Brothers & Yule, St. Louis, have sent out a four-page leaflet relative to the merits of Alexander George's Creek smithing coal, for which the company are distributing agents.

The Waterbury Brass Company, 122-130 Center street, New York, have recently published a neat and attractive booklet bearing the title "Signs of the Times." The pamphlet constitutes a short treatise on the manufacture and sale of brass for use in making signs and stencils.

Rogers, Brown & Co., pig iron merchants, who have offices in ten of the leading cities, have issued an interesting pamphlet, entitled "Kish, Son of Carbon," which they state is intended for the A, B, C class in pig iron. It is a most attractive explanation of the cause of the appearance of "kish," well known to foundrymen, and gives a practical remedy which may be used for its prevention. Technical terms are avoided as much as possible, such language being used as will make the matter plain to those who are uninformed as to chemical action.

Metal Market.

NEW YORK, January 13, 1904.

Pig Tin.—Conditions prevailing at the time of our last writing also characterized the week under review. Business was very slow and prices advanced as a result of continued manipulation abroad. American consumers are putting the London and Chinese manipulators to a severe test by withholding their business, but the latter are holding out surprisingly well. At the close to-day spot and January deliveries were quoted 29.25c. to 29.50c., and both spot and futures in London were cabled £133 15s. The arrivals so far this month amount to 705 tons, and it is estimated that 2350 tons are afloat.

Copper.—A strong effort is being made by the leading producers to lift the market, and the last week responded with higher quotations. There was little business, however, from home consumers, with the exception of a reported sale of 4,000,000 lbs. of Calumet & Hecla to the Brass producers in the Naugatuck Valley. The authenticity of this report cannot be established and little interest is taken in it in the trade. It is generally admitted that a transaction of this kind would be quite plausible, but as it would be of a very private nature and under some form of guarantee against future fluctuation of prices, little interest is taken in it. Buying on a hand to mouth basis is becoming more and more the rule among the average consumers. The belief exists in the trade that the large firm of Copper producers are through their selling agency resorting to old tactics of manipulation, lifting the market step by step to a point where they will decide to sell upon the best basis possible, even though the market should fall considerably while they are unloading. In the present upward movement they are aided by a heavy demand from abroad, which, however, will create a surplus there to help matters when the decline comes. At this writing Lake is quoted 12.75c.; Electrolytic, 12.62½c. and Casting, 12.50c. The London market has advanced to £58 5s. for spot, £57 12s. 6d. for futures, and £62 10s. for Best Selected. The exports thus far this month aggregated 10,000 tons, which is as large as the entire shipments for the month of January of last year. The prompt deliveries against export orders which are obtainable convince the trade that there is plenty of Copper in producers' hands.

Pig Lead.—The market is very strong, primarily because of action taken by the American Smelting & Refining Company during the week. They have withdrawn from the market to the extent of declining to quote otherwise than the prevailing price on the date of shipment. As this furnishes the consumer no protection whatever against rapid advance on futures, only immediate necessities are being provided for. Spot is quoted here by outside holders at 4.45c. to 4.55c., and St. Louis wires 4.20c. to 4.25c., while the London cable announces £11 12s. 6d.

Spelter.—Is quiet, with spot quoted here 5c. to 5.10c., St. Louis 4.80c., and London £21 15s.

Antimony.—While Cookson's has declined a shade, all other brands have advanced. The market is: Cookson's, 6.75c.; Hallett's, 6.50c., and other brands, 5.75c. to 6c.

Nickel.—No change is noted in this market, 40c. to 45c. being quoted for large lots, and 50c. to 60c. for smaller quantities.

Quicksilver.—The market is quiet, but steady. Flasks of 76½ lbs. are quoted at \$47.50. London is quoted at £8 5s.

Tin Plates.—The market is quiet, with a fair amount of business in a small way. Quotations are made on the basis of \$3.60 per box of 14 x 20 100-lb. Cokes, f.o.b. mill, equivalent to \$3.79, New York.

New York.

NEW YORK, January 13, 1904.

Pig Iron.—The market has been rather quiet during the past week, and only a moderate tonnage has been placed. A moderate amount of business has been done in Basic Pig on the basis of about \$13.75, delivered, at Eastern Pennsylvania points. We continue to quote: Northern No. 1 Foundry, \$15 to \$16; No. 2 Foundry, \$14.50 to \$14.75; No. 2 Plain, \$13.75 to \$14.25, and Gray Forge, \$13.25 to \$13.50, tidewater. Tennessee and Alabama brands are quoted: \$14.25 to \$14.50 for No. 1, \$13.75 to \$14 for No. 2, and \$13 to \$13.25 for No. 3.

Steel Rails.—The market is very quiet. It is estimated that the mills are well supplied with orders to run until the end of April. Some figuring is now going on for the New York Central order, the magnitude of which is not yet fully determined. The mills continue to ask \$28 for Standard Sections.

Cast Iron Pipe.—Nothing of special interest has occurred during the week. No large lots are at present in sight, but prospects continue fully as promising as mentioned in recent reports. Carload lots are quoted at \$28 per gross ton for 6 to 10 inch, and \$27 for 12-inch upward, at tidewater, with concessions on large quantities.

Finished Iron and Steel.—The American Bridge Com-

pany have made a good start for the new year. The largest single contract received was placed by the Delaware, Lackawanna & Western Railroad Company for bridge work, amounting to 7500 tons, but small orders booked in the Eastern division aggregated over 3000 tons, and as much more was secured in the case of the other two divisions. Quite a little work is offering, and a good tonnage is expected to be placed in the near future. Among the building contracts coming up in this city is the Printers' and Publishers' Building on Thirty-eighth street, which will require 9000 tons. Building contractors are expecting a normal amount of work, at least, this year, with the possibility that the volume may be larger if the financial conditions prove favorable. The plate mills report a good volume of business in small lots, but the larger orders, to which reference was recently made, are still in abeyance. Bar Iron manufacturers report a general disposition among local buyers to cover their requirements. In some cases inquiries are received, covering deliveries for four months, but mills are not inclined to take orders for such long delivery at present prices, feeling confident that as spring advances they will be able to get more money. We quote at tidewater as follows: Beams, Channels, Angles and Zees, 1.74½c. to 2c.; Tees, 1.79½c. to 2c.; Bulb Angles and Deck Beams, 1.84½c. to 2.05c. Sheared Plates in carload lots are 1.74½c. to 1.85c. for Tank, 1.84½c. to 2c. for Flange, 1.94½c. to 2.10c. for Marine, and 1.94½c. to 2.50c. for Fire Box, according to specification. Common Bar Iron, 1.30c. to 1.40c.; Refined Bars, 1.45c. to 1.60c., according to quality; Soft Steel Bars, 1.44½c. to 1.50c.

Old Material.—A local railroad company put out last week one of the largest lists of Scrap that has been seen for some time. Bidders will probably be advised to-day of the result of the propositions which they have submitted. The local demand has shown but little improvement. Prices are difficult to quote, as in some lines a variation of \$2 per ton is noted, according to quantity, terms, &c. Approximate quotations per gross ton, New York and vicinity, are as follows:

Old Iron Rails.....	\$15.50 to \$16.00
Old Steel Rails, long lengths.....	12.00 to 13.00
Old Steel Rails, short pieces.....	11.00 to 11.50
Relaying Rails, heavy sections.....	18.00 to 19.00
Old Car Wheels.....	12.50 to 13.00
Old Iron Car Axles.....	16.00 to 17.00
Old Steel Car Axles.....	14.00 to 15.00
Heavy Melting Steel Scrap.....	11.00 to 11.50
No. 1 Railroad Wrought Iron.....	12.00 to 13.00
Iron Track Scrap.....	11.50 to 12.50
Wrought Pipe.....	9.00 to 10.00
Ordinary Light Iron.....	7.00 to 7.50
Cast Borings.....	5.00 to 5.50
Wrought Turnings.....	8.00 to 8.50
No. 1 Machinery Cast.....	12.00 to 12.50
Stove Plate.....	9.50 to 10.50

The Steel Corporation's Profit Sharing Plan.—The United States Steel Corporation, on January 12, issued the following statement in connection with their profit sharing plan:

The plan adopted December 31, 1902, is still in force, and employees are subscribing for the second year on the same basis as the first year, except the price fixed for the second year is \$55 a share.

When the plan went into operation a year ago the price at which subscriptions were made by employees was \$82.50 per share. About 28,000 employees at that time subscribed for about 40,000 shares. All employees, including those who subscribed a year ago, will be eligible to make subscriptions.

The announcement that the profit sharing plan would be continued, and that employees would be offered the preferred stock on a basis of \$55 a share was favorably received by the stock market, speculators inclining to the belief that the stock will not be allowed to drop below \$55 a share. It is reported that a very considerable proportion of the preferred stock sold to employees under the original proposition has been returned.

The Columbia Machine Works & Malleable Iron Company, 247 Chestnut street, Brooklyn, N. Y., have during the past year greatly enlarged their plant and increased their capacity for the manufacture of their general line of trolley poles and street railway supplies. They have recently gone more extensively into the manufacture of malleable and gray iron castings as well as light and heavy forgings. The main building of the plant is a three-story structure, 45x200 feet, to which has been added a new gray iron foundry, 150 feet square malleable iron foundry, 100x200 feet, and a new trolley pole shop, 60x125 feet. The plant is equipped with modern machinery, and in the yard is a 100-ton scale. Excellent shipping facilities are furnished by direct connection by a switch with the tracks of the Long Island Railroad. The company do a large amount of work for the principal trolley systems throughout the United States, among which may be mentioned the Brooklyn Rapid Transit Company, United Railway Company of San Francisco, and the Pittsburgh-Everett Traction Company.

HARDWARE.

THE present month is a very important one, so far as the work among the retail Hardware associations is concerned. The year which has just begun is, indeed, a crucial one, as their future will depend largely on the record made and the position which they attain. Up to this time, while there has been good work done which has more than justified their existence, the associations have found the matter of organization requiring their first attention and best energy. As a result the movement has attained a most important place in the trade, and the many State associations and the strong national organization are thoroughly representative of retail Hardware interests, thus achieving a success which a few years ago would have been deemed unattainable. The presence of the representatives of the retail movement at the Atlantic City conventions, on the invitation of the American Hardware Manufacturers' Association and the National Hardware Association, was a distinct advance, and gave the National Retail Hardware Dealers' Association a standing among the great organizations of the trade. The impression made, too, at this great gathering of jobbers and manufacturers was exceedingly favorable, and impressed all with the caliber, balance and influence which are to be found among the progressive retail merchants of the country.

While much has thus been accomplished, much remains to be done. The work of organization should be carried into States which are thus far without their associations. Attention in many States should be given to forming subordinate or more detailed organizations, perhaps in some cases dividing States and establishing separate, though related, associations, thus removing some of the difficulties connected with organizations which cover too much territory for convenient access to the meeting, and permitting organizations which would be more homogeneous than is at present the case. The importance, too, of forming local associations of merchants in the same or even adjacent towns is one of great importance, and if carried into effect would do much to diminish existing evils. The work, too, of securing a larger membership must command attention. While there are some Hardware merchants who lack the public spirit and enterprise to take hold of a movement which calls them out of town for a day or two and involves outlay and expense for which there is no immediate return in dollars and cents, there are a great many excellent houses and able merchants whose support should be secured, and who, if the matter were presented to them in the right light, would be glad to help it along, partly for their own sake, but principally for the benefit of the trade as a whole. The work of securing the membership of these representative houses and obtaining the potent influence which they would add to the movement must engage the thought and effort of those who desire to see retail organization take the place to which it is entitled.

There are, too, a great many questions to be decided and plans to be put into action for the protection of the interests of the retail trade. Selling by the jobbers to consumers, even the legitimate customers of the retail merchants, is not yet a thing of the past. The problem of the catalogue house has not been solved, though something has been accomplished by which the evils under which the trade labors are, in some respects, diminished. The retail merchants have a work to do in inducing manufacturers in making their schedules of prices, whether

by quantity discounts or otherwise, to regard the interests of the retail trade as well as those of the jobbers. There should be a distinct recognition by the manufacturers of the rights of the retail trade, and efforts consistently made to serve the interests of these merchants as well as those of the wholesale merchants. The contest in regard to the parcels post is not yet concluded, and those who oppose the movement should be alert, remembering that its friends are unrelaxing in efforts and using every means for the accomplishment of their ends. The great work, too, of educating the membership of retail associations, giving them broad views and cultivating good methods, is one which may be carried on indefinitely, and does much to make the organizations useful to the membership as well as elevating to the trade as a whole.

February is the great month for the meetings of the retail associations, the success of which will depend very largely on the preparations which are made to secure a large attendance and to render the meetings interesting and useful. The successes or disappointments of the past, the results of experience, perhaps we might say of experiments, in this field, the recognition even of mistakes made, should all contribute to the making of plans and arrangements which will make the coming meetings creditable, influential, and in every way successful. A great responsibility obviously rests on the officers and committees in charge, on whose intelligence, energy and wisdom so much depends. They should certainly be given the heartiest support from the membership. As the result of the efforts thus put forth, we hope to be permitted to chronicle a marked advance during the present year in the work of retail organizations, which is now in so interesting and promising a stage.

Condition of Trade.

The principal event in the trade during the week under review is the advance in Wire Nails, Barb Wire, &c., by the American Steel & Wire Company. It indicates a genuine strength in these lines, based upon a good demand, which comes as a result of the caution with which purchases had been made for some time, requiring the trade recently to purchase freely to replenish their depleted stocks. The manufacturers are consequently well supplied with orders. The situation is the more satisfactory as the indications point to a similar advance by outside mills. The effect on the market as a whole will undoubtedly be good. It will tend to give courage to halting and hesitating buyers who have been holding off on account of the downward trend of things. Since the opening of the year business in general has been more active. While there is no speculative buying, merchants in all parts of the country, more noticeably than in the East, are placing orders with a good degree of liberality, recognizing that the goods will be taken off their hands before long, as current business is in excellent shape. The advance, too, in Rivets, which is announced in another column, will be noted with interest. The change in list prices seems to be justified by the inequalities which are thus corrected. The market generally shows but little change in quotations, and has a fairly steady tone. While there will very likely be animated competition for orders, as the expanded facilities of manufacturers give them a capacity which in many lines will probably exceed the demand, there does not appear to be reason to apprehend in the near future radical reductions in prices, and merchants are certainly justified in keeping their

stocks well assorted, so as to take care in good form of their current trade. Export demand continues good, and it is likely that the present year foreign markets will take a largely increased volume of American products.

Chicago.

(By Telegraph.)

The most noteworthy features of the Hardware situation this week are the increase in the price of Wire Nails, Smooth and Barbed Wire, amounting to \$1 per ton clear through the list, and the decrease in the price of Cut Nails to \$1.75, base, per 100 pounds in car lots to the retailer. With the business of the Chicago Steel Mfg. Company diverted temporarily to other mills, owing to the fire in that plant, and in connection with the advance in price on Wire Nails, it looks as though the present Cut Nail mills will have no difficulty in keeping their Nail machines busy for a time at least. Bar Steel and Iron are moving only fairly well. Galvanized and Black Sheets are being bought only in sufficient quantities for nearby requirements. No marked changes in prices have been made on Nuts and Bolts as the reduction in cost of Iron and Steel Bars had been discounted. In Builders' Hardware the trade, always impatient of change, has not taken kindly to the many changes made by the five leading producers, even though they may admit that the changes place the lists on a more equitable basis than they were before, eliminating many absurdities in former prices. Spring goods are moving satisfactorily, and the tone of the whole Hardware market, with the possible exception of Heavy Hardware, is strong and confident.

St. Louis.

(By Telegraph.)

In jobbing Hardware circles there is general activity, and it is said that the dealers' demands are coming forward in satisfactory volume. The road forces have returned to their respective fields after the holiday interruption, and the campaign for new business in 1904 will be pushed more diligently than ever before. This being the World's Fair year, local jobbers may expect hosts of their customers, who will come to St. Louis primarily to see the great Fair, but many will undoubtedly combine considerable business with pleasure. Winter supplies move freely, and the preparation for spring trade is showing in the steadily increasing volume of sales and inquiry.

St. Paul.

FARWELL, OZMUN, KIRK & Co.—The business conditions under which the old year went out and 1904 came in are fully as favorable as expected during the latter half of the year, and, upon the whole, it may be stated that there has been some improvement. The year has not been quite so favorable as 1902, but it has been, nevertheless, one of the good years. The volume of trade in most lines has not been up to the business of 1902. The profits in Hardware have also been a little affected by the depreciation in prices of some lines of staple goods, so that upon the whole the showing of profits will be less. It is to be said, however, that 1902 was an exceptionally good year for the Hardware trade in the Northwest, and we do not expect often to see so favorable a showing.

Trade continued active during the fall, and kept up remarkably well until the salesmen were called in before the holidays. The weather has been unusually favorable, not only during the later fall, but also thus far in the winter, although it is a colder winter than the average. The Northwest has thus far been spared very severe storms, and the conditions for the moving of produce and of all commodities have been unusually good.

The prospects for the new year are quite satisfactory. The retail merchants' stocks are not large, as they have been buying carefully for the past year, and it is expected that their wants for the spring business will be reasonably large. It is not probable that they will buy in large quantities, but we may expect that their orders will be frequent, and that in the aggregate their demands will be considerable. It is not probable that prudent retail dealers will hesitate to buy for their wants on ac-

count of possible declines which they may fear. On the contrary, we believe that the general view entertained among them is that few declines of consequence may be expected, at least during the early part of the year, and the same will probably hold good on in the year if the conditions of trade continue favorable, as they now indicate. Hardware is certainly not high at its present prices, and it is difficult to see how manufacturers can reduce prices on it, at least until they are paying lower wages to labor.

Collections have not been quite up to average, but they are not bad, and the probabilities are that there is considerable money to come into circulation from the moving of the crops that have not been marketed. Business will be conducted generally on a conservative basis. It is probable, however, that it will not be largely affected by the Presidential year, as the issues that will be before the people do not promise to be such as will create the public alarm and disturbance of business that were experienced four years ago. Neither is it probable that the domestic mercantile business of the country will be largely affected by the possible foreign wars. The salesmen are now on the road, and the business of the new year will soon be in full swing.

NOTES ON PRICES.

Wire Nails.—On January 11 the leading producer advanced the price on Wire products \$1 per ton beyond former quotations, including Wire Nails, Barb Wire and Smooth Fence Wire. This represents an advance of 5 cents per keg on Wire Nails. The advance was made because of the very heavy tonnage which has been booked during the past three weeks, and because of the low stocks in manufacturers' hands, and their inability to increase them during the month of December. The stronger position which other Steel products have reached within the past week or ten days was also taken into consideration. The manufacturers are advising the trade to send in specifications as soon as possible, on account of the prospective shortage of Nails for spring delivery. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots.....	\$1.90
Retailers, carload lots.....	1.95
Retailers, less than carload lots.....	2.05

Leading outside manufacturers of Wire Nails and Wire are making a similar advance, and the market is in a perceptibly improved condition.

New York.—Local demand is light, and the market is devoid of interesting features. Quotations at the 5-cent per keg advance, are as follows: Single carloads, \$2.05; small lots from store, \$2.15.

Chicago, by Telegraph.—There is a possibility of a shortage in Wire Nails and other Wire products before the high of the season is reached. The leading producers have enough orders booked to keep their mills running continuously for three months, and independent mills are also sold ahead. There is every prospect for this reason that the advance in prices of \$1 per ton, which took effect yesterday, will be maintained, and that further advances are not out of the question. We quote carload lots to jobbers, \$2.05 per 100 pounds, Chicago; less than carload lots, \$2.15; car lots to retailers, \$2.10, all f.o.b. Chicago.

Pittsburgh, by Telegraph.—The American Steel & Wire Company, Pittsburgh Steel Company and all other leading Wire and Nail concerns have advanced prices on all kinds of Wire and Wire Nails 5 cents per 100 pounds. Minimum price of Wire Nails is \$1.85, and \$1.95 in ordinary carload lots.

Cut Nails.—At the meeting of the Cut Nail Association, held on January 7, the price was reduced \$4 per ton, or 20 cents per keg below former official quotations. This was a radical cut in price, but the majority of those at the meeting were in favor of reducing the price. It is quite generally conceded that the manufacturers cannot make Nails at the reduced price and come out whole, and the view has been expressed that by the time the next meeting is called there will be a general desire to have the price advanced. The reduction

applies to Steel and Iron Nails in all quarters. Quotations, at the reduction, are as follows: \$1.70, base, in carloads, and \$1.75 in less than carloads, f.o.b. Pittsburgh, plus freight in Tube Rate Book to point of destination; terms, 60 days, less 2 per cent. off in 10 days.

New York.—There is a limited demand in the local market. Quotations at the reduced price are as follows: Carloads on dock, \$1.84½; less than carloads on dock, 92½; small lots from store, \$2.

Chicago, by Telegraph.—The Cut Nail Association, which met in Pittsburgh last Thursday, decided on a price of \$1.75 per 100 pounds, base, in car lots, to the retailer, which, with the freight added to Chicago, makes the price on Cut Nails \$1.91½. The Chicago Steel Mfg. Company, whose mill was burned, announce that they have made arrangements with other mills by which they will take care of all orders, and that they will rebuild their plant with all speed.

Pittsburgh, by Telegraph.—At a meeting of the Cut Nail Manufacturers' Association, held on January 7, the price of Iron and Steel Cut Nails was reduced from \$1.90 to \$1.70 per keg in carloads and \$1.75 in less than carloads, plus rate in Tube Freight Book, to point of destination. Demand is fair and it is believed the new price will be rigidly held.

Barb Wire.—On January 11 an advance of \$1 per ton above former official quotations was made by the largest producer. A very large tonnage has been placed, and a shortage of supply is spoken of. Quotations, at the advance, are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.20	\$2.50
Retailers, carload lots.....	2.25	2.55
Retailers, less than carload lots.....	2.35	2.65

Chicago, by Telegraph.—In common with other Wire products Barbed Wire has been advanced \$1 per ton, making the price to jobbers in car lots \$2.35, Chicago, for Painted, and \$2.65 for Galvanized. Retailers buy their Wire at 5 cents per 100 pounds higher than this price in car lots and 15 cents higher in less than car lots. Staples have been advanced to \$2.20, Chicago, for Plain and \$2.60 for Galvanized to jobbers, with 5 cents advance to retailers.

Pittsburgh.—Business is light, demand being only for small lots. We quote as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.20	\$2.50
Retailers, carload lots.....	2.25	2.55
Retailers, less than carload lots.....	2.35	2.65

Smooth Fence Wire.—The price was advanced on January 11 \$1 a ton above former official quotations, by the largest producer. Demand is very satisfactory for the season, and contracts for considerable tonnage have been placed. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.85
Retailers, carloads.....	1.90
Less than carloads.....	2.00

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12	12½	13	14	15	16
Annealed.....Base.	\$0.05	.10	.15	.25	.35	.45	.55		
Galvanized....	\$0.30	.35	.40	.45	.55	.65	1.05	1.15	

Chicago, by Telegraph.—The oversold condition of the Wire mills all over the country has led to an advance of \$1 per ton in Smooth Fence Wire, making the price of base sizes Nos. 6 to 9 \$1.95 per 100 pounds in car lots to jobbers, f.o.b. Chicago, and \$2.05 in less than car lots. The extra of 30 cents for Galvanized continues on Nos. 6 to 14, with 60 cents extra on Nos. 15 and 16.

Pittsburgh.—Demand is fairly active, but prospects for spring trade are regarded as very good. We quote as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days: Plain Wire, \$1.80 to \$1.85, base, for Nos. 6 to 9 in carloads to jobbers and \$1.95 to

\$2 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14 and 60 cents extra for Nos. 15 and 16.

Larson Pincers.—The following reduced prices on Larson Pincers are announced by the Washington Tool Company, Owatonna, Minn., under date of January 1:

	Per doz.
No. 1—Blacksmith, 13-inch	\$8.50
No. 2—Light Jaw, 12-inch.....	7.20
No. 2—Heavy Jaw, 12-inch.....	8.00
No. 3—Combination (with bolt holder), 14-inch....	8.50
No. 3—Without Bolt Holder, 14-inch.....	8.25
No. 4—Carpenter, 10-inch	6.50
No. 5—Baby Pincers, 8-inch	4.50

Accompanying the list are retail selling prices recommended by the manufacturers.

Cordage.—Demand is quiet, including both Manila and Sisal Rope. Requirements for special cordage are more active. Prices are well maintained, for the season. Quotations on the basis of 7-16 inch diameter and larger are as follows: Pure Manila, 11½ cents; second-grade Manila, ½ to 1 cent per pound lower; Pure Sisal, 9¼ cents; Mixed Sisal, 8¼ cents per pound. These quotations are subject to a rebate of ¼ cent per pound to carload buyers.

Glass.—The Window Glass market is in an undesirable condition both for seller and buyer. Quotations range from 90 to 90 and 10 per cent. discount from the manufacturers' price-list of January 1, 1901. The latter price appears to be as low a figure as manufacturers will accept for carload lots, and some Glass has been sold at that figure. Buyers are ready to place orders for stocks, but are timid, some asking if better than 90 and 10 per cent. discount cannot be obtained. Manufacturers claim that 90 per cent. discount represents the cost of Glass under the most favorable conditions, and that they are selling just enough to pay their men and keep the factories running. A number of factories have closed down rather than make Glass at a loss. At present it appears that if the scale of wages is not lowered the factories which can hold out will be able to get a better price for their product when demand really begins. Stocks in jobbers' and dealers' hands are low, and the fire will end June 1. The factories which continue to run will have to produce enough Glass to supply the spring and summer demand before that time.

Paints and Colors.—**Leads.**—The liberal orders which have been booked for spring delivery indicate the anticipation by the trade of a good demand for White Lead in Oil. This view is strengthened by the fact that for the first time in months building operations are relieved from labor complications. Prices are somewhat irregular, especially on the less well-known brands. Quotations are as follows: In lots of 500 pounds or over, 6½ cents; in lots of less than 500 pounds, 7 cents per pound.

Oils.—**Linseed Oil.**—Large buyers are waiting for crushers to reduce prices before placing contract orders, and crushers are waiting for large buyers to be forced to come into the market for supplies. Large buyers can probably defer buying to any great extent for 60 to 75 days, and it remains to be seen whether crushers will hold to present or higher prices for that length of time, or longer. The crushers are supposed to have bought large quantities of seed. Demand is for small lots of Oil. Quotations are as follows: City Raw, in lots of five barrels or more, 37 cents; in lots of less than five barrels, 38 cents per gallon. Out of town and Western Oil, 35 to 36 cents per gallon.

Revised Rivet List.—The revised Rivet list adopted by the manufacturers of Rivets, January 8, 1904, embodies some changes which do not materially alter the net result, although the prices are differently arranged. For instance, while formerly the lists were based on bulk shipments with extras added for rivets put up in the various small packages, the lists are now for 5 and 10 pound boxes, with rebates for the goods in bulk. Formerly the base size was ½ inch and longer, now it is 1 inch and longer. Similar changes have been made in Tinners' Rivets to conform with the new method of selling measured Rivets. The manufacturers announce a discount of 75 per cent. from the list, with an extra discount for large quantities. The new list is given in full herewith:

FACTORY COST AND BUSINESS METHODS.

THE FACTORY AND OFFICE SYSTEM OF THE ATLAS MFG. COMPANY.

The first article of this series, published last week, described the Scheme Book of the Atlas Mfg. Company, and gave some of its contents. In the part given below are the remainder of the rules for the Machine Room, and the rules for the Tool and Supply Room.

PART II.

MACHINE ROOM.—Page 30 (Continued).

SEC. 4. Under "Operating Expense," charge all repairs on dies, the making of new dies to take place of old ones; all ordinary repairs and adjustments to machinery, feeds,

No.	Name of Machine
1	Lathe
2	Planer
3	Small Engine
4	Lathe
5	Planer
6	Small Engine
7	Lathe
8	Planer
9	Small Engine
10	Lathe
11	Planer
12	Small Engine
13	Lathe
14	Planer
15	Small Engine
16	Lathe
17	Planer
18	Small Engine
19	Lathe
20	Planer
21	Small Engine
22	Lathe
23	Planer
24	Small Engine
25	Lathe
26	Planer
27	Small Engine
28	Lathe
29	Planer
30	Small Engine
31	Lathe
32	Planer
33	Small Engine
34	Lathe
35	Planer
36	Small Engine
37	Lathe
38	Planer
39	Small Engine
40	Lathe
41	Planer
42	Small Engine
43	Lathe
44	Planer
45	Small Engine
46	Lathe
47	Planer
48	Small Engine
49	Lathe
50	Planer
51	Small Engine
52	Lathe
53	Planer
54	Small Engine
55	Lathe
56	Planer
57	Small Engine
58	Lathe
59	Planer
60	Small Engine
61	Lathe
62	Planer
63	Small Engine
64	Lathe
65	Planer
66	Small Engine
67	Lathe
68	Planer
69	Small Engine
70	Lathe
71	Planer
72	Small Engine
73	Lathe
74	Planer
75	Small Engine
76	Lathe
77	Planer
78	Small Engine
79	Lathe
80	Planer
81	Small Engine
82	Lathe
83	Planer
84	Small Engine
85	Lathe
86	Planer
87	Small Engine
88	Lathe
89	Planer
90	Small Engine
91	Lathe
92	Planer
93	Small Engine
94	Lathe
95	Planer
96	Small Engine
97	Lathe
98	Planer
99	Small Engine
100	Lathe

Fig. 6.—Catalogue Showing Machine Numbers.

&c., made necessary in operating the machine. (For Extraordinary Repairs, &c., see Sec. 5.) These charges should be made against the particular head under which the work properly comes, as Spoon work, Bracket or Hooks.

JOB WORK.

SEC. 5. All other work is to be kept track of as separate jobs, each job being represented by a card in the rack in the usual way. This would include all new work, both in the machine shop and outside, the total cost of which for labor and material amounts to at least 50 cents. If less than 50 cents it would be charged either as a part of some other job or under one of the expense accounts. Included under this head also would be the unusual repairs to machinery (such as breaking a frame or fly wheel of a machine), and which would be in excess of the ordinary repairs incident to operating the machine; also any smaller repair or expense job may, as stated in Sec. 1, be taken out of its own particular account and carried as a separate job whenever it is desired to do so.

SEC. 6. The expense of keeping up machine room cutting tools and other facilities is to be charged to the particular job they happen to be used on when the repair is necessary, provided the total cost in labor and material does not exceed 50 cents. If such expense exceeds 50 cents it is to be done as a separate job and charged to

General Expense, as should repairs under 50 cents when there is no particular job to charge them to.

NUMBERING.

SEC. 7. Machines are numbered⁷ from 1 to 999, and each machine, hand or bench fixture, &c., except vises and other small appliances in the machine room is to have a number. Vises, &c., are grouped as explained on page 151, Sec. 3, d.

SEC. 8. Each attachment⁸ to a machine is to have a number, consisting of the number of the machine and a letter, as 70-A.

SEC. 9. Each set of "Operation Tools"⁹ is to be numbered, commencing with 1000, and the principal pieces in

REQUISITION SLIP.

Material wanted *Tool Steel 1 1/2 x 1/2*

Size or kind *1/2 x 1/4*

Quantity *12" long*

For job no. *10*

Delivered to *Tom Smith*

If from stock *200*

Date of charge *Jan 31/1903*

(If special)

Remarks

Fig. 7.—Requisition Slip.

the set are to bear the number, as always the punch and die, upper and lower beds, guides, &c. Duplicate parts are marked A, B, C, &c.

SEC. 10. An attachment is considered to be that part of a feed or other device which is fastened to the machine itself, and which is not taken away with the die or holder. Independent beds and holders are also considered to be attachments to the machine they are used on.

SEC. 11. Sets of "Operation Tools" consist of all the dies, punches, beds, guides and other parts that are used together in the performance of any operation in the Manufacturing Department.

MATERIAL REQUISITION SLIPS.

SEC. 12. All material is to be obtained from the boy in charge of the stock and tool room (see page 40), and upon written requisition¹⁰ only. Printed slips for this purpose are to be provided. These requisition slips should state the kind and quantity of the material wanted, the name of the person making the requisition, and the number of the job it is for.

RUMMAGE HEAP.

SEC. 13. All material taken from the rummage heap¹¹ should have a ticket made out for such as is used and handed to tool room boy to be sent to the office¹² with other memorandums for material.

⁷ A list of the numbers assigned to the different machines is kept in the tool room on cardboard fastened to a shellaced board. This list has been reproduced in Fig. 6.

⁸ The meaning of attachment is defined in Sec. 10.

⁹ The meaning of "operation tools," as used here, is described in Sec. 11.

¹⁰ Fig. 7 is a reproduction of one of the requisition slips, which measure 4 x 4 1/4 inches. Their use and the method of making charges are described on page 40, Sec. 7.

¹¹ The rummage heap consists of discarded machines, parts, metal, &c., which may some day be of use, and so is not disposed of as old metal. The difference between this and scrap or waste should be noted.

¹² The value of material taken from the rummage heap is considered the same as was assigned to it at inventory time when in the rummage heap.

TOOL AND SUPPLY ROOM.¹³—Page 40.

SEC. 1. The boy in charge of the tool room will be responsible for the order and cleanliness of the room. All boxes, shelves, drawers, racks,¹⁴ &c., are to be numbered, lettered or named in some distinctive way.

LIST OF TOOLS, EXTRA PARTS, TEMPLETS, SPECIAL MILLS, INVENTORY NUMBER AND ATTACHMENTS.

SEC. 2. A List¹⁵ of all tools, dies, &c., in the room is to be kept, and their places in the room indicated on the list. Each set of dies should have a shelf or box, dies for one or more operations being assigned to one box or shelf, as the case may be. All extra parts of machines are to be put in a special place, preferably in one of the large steel

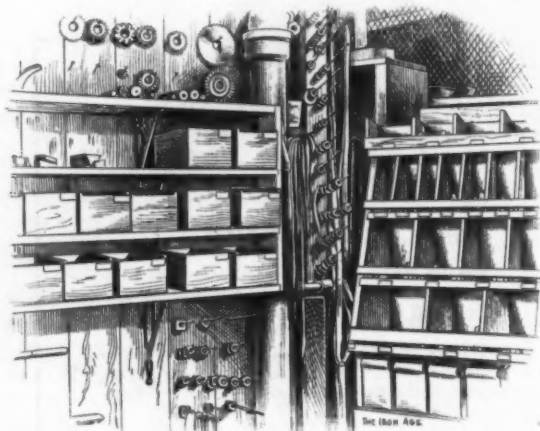


Fig. 8.—A Corner in the Tool Room.

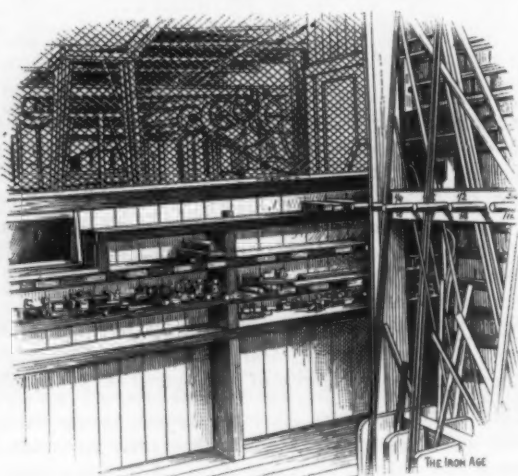


Fig. 9.—A Corner in the Tool Room.

boxes,¹⁶ and their location indicated on the list. Templets, special mills, cutting tools, &c., are to be hung up in accordance with some orderly plan on nails or racks, and the place of each one marked, and marked on the list

¹³In the tool and supply room are kept tools, dies, templets, &c., and also such supplies as are needed in the machine room.

¹⁴In Figs. 8 and 9 are shown views of corners in the tool room. Fig. 8 shows the arrangement for keeping cap screw, bolts and some of the mills. It will be noticed that each bin is carefully marked with its contents. Fig. 9 shows operation tools on shelves. Others are contained in the iron boxes in back of the rack for iron and steel. The shelves, boxes and rack are all properly marked. Mr. Bradley believes that every tool and part should have a place. Other operation tools are kept in compartments in drawers in a large cabinet. In the left of the illustration may be seen the window leading to the Manufacturing Department. Another window in the other side of the room leads to the Machine Room.

¹⁵The tools, dies, &c., are kept on separate lists. These are made on heavy paper and are backed with cardboard. A sheet of celluloid is placed across the paper to protect it from dirt and damage in handling. One of these lists, of which there are several, the "Index to the Location of Dies," is reproduced in Fig. 10.

¹⁶These are shown in Fig. 9.

as directed. Extra dies over the regular inventory number and unfinished parts of dies are to be kept in one of the large steel boxes, and the numbers of these boxes indicated on the list. A special place is to be provided for attachments, and as far as convenient all attachments are to be kept there and the place indicated on the list.

SEC. 3. Tools and dies given out for the Manufacturing Department are to be replaced with a card showing the date when taken and the person taking them. When these tools are returned the date is to be noted on the memorandum, the dies cleaned and put on the bench with the memorandum with them, and the superintendent of the Machine Room advised that they are ready for his inspection, all of which is to be promptly done. If they are all right, the memorandum is to be destroyed and the tools put in their proper place. If they are to be repaired, they are to be put in a place by themselves with the memorandum still with them, and sample of the work last done by them. When they are taken into the machine shop, the date and person doing the work are to be noted on the memorandum, and memorandum again placed in the box to await the return of the tools, when it is to be destroyed.

MATERIAL AND SUPPLIES.

SEC. 5. All machine room material and machine room supplies are to be received by the tool room boy, and a

Index to Location of Dies													October 1903												
													4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17
Shelf (Back)	1																								
Flaming Wires	2																								
Flaming Wires	3																								
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Fig. 10.—Index to the Location of Dies.

memorandum¹⁷ of each lot handed promptly to the office. This memorandum should state weights, quantity, sizes, &c., and should note whether quality is all right or not. In addition, it should state whether the material is for stock or for some special job. If for a special job, the number of the job should be stated. All special material, the job number of which appears on the memorandum, will be charged to the job at this time from this memorandum, and in order that it may not get charged a second time from the weekly account of material furnished to different jobs, this charge should be indicated on the weekly account as explained below. (See page 40, Sec. 7.) In case the job has not been started, the superintendent of the machine room will assign a letter at this time.

MATERIAL RECEIVED AND MATERIAL CHARGED.

SEC. 6. All material is to be reported promptly to the superintendent as soon as it is received, and then put in its proper place. Before putting into the rack, all soft steel is to be marked with a heavy line of white paint running its entire length. All castings, special parts, &c., and other material, the use of which can be ascertained at the time it is received, are to be marked in white paint with the number of the job they are for and the date upon which they were received. These dates and job numbers appearing on pieces of material show that they are for special work and that they have already been charged to their respective jobs on the same date as is marked on the material itself.

REQUISITION SLIPS.

SEC. 7. All machine room material and machine room supplies are to be kept in the tool room. All machine room

¹⁷A memorandum of this style is shown in Fig. 11. These blanks are supplied in pads and measure 4 inches square.

material is to be delivered by the tool room boy and upon written requisition¹⁸ only. These requisition slips should state the kind and quantity of the material wanted, the name of the person to whom the material is given, and the number of the job it is for, also whether the material

Date,	10/12/03
RECEIVED	
From	C. Spunko
Article	Steel 1/4 x 1/2
Quantity	60 lbs. 1 bar
Delivered by	their boy
Remarks	E

Fig. 11.—Memorandum of Material Received.

was ordered special for the particular job, and therefore already charged in accordance with Sec. 6, or whether it was taken from stock or the rummage heap. The value of screws, bolts, &c., is to be marked¹⁹ on the bins containing them, and in the case of all articles so marked the value is to be entered on the slip. Articles too small to weigh or measure are to be put in at 5 cents

Filister Hd. Cap Screws.

3/8 x 16 x 1/8

48¢ per doz.

Fig. 12.—Label on Bins.

each. An account²⁰ of all the material furnished each job is to be handed into the office each Monday morning, and this account is to state those items which have been previously charged, and those which have not, as above.

(To be continued.)

¹⁸ The form used for this is shown in Fig. 7.

¹⁹ By referring to Fig. 8, it will be seen that small white labels are placed on the bins and boxes. One of these labels is reproduced in Fig. 12. The first two lines are descriptive of the goods and the bottom line gives the price to be charged up. On the labels the lines descriptive of the goods are written in black ink, and the price is put in with red ink to call attention to it.

²⁰ By this is meant that the requisition slips, Fig. 7, have the value of the material noted on them before being turned into the office.

THE NECESSITY FOR THE TRAVELING SALESMAN.

A VERY enjoyable reception was extended to the traveling salesmen of St. Paul by the Commercial Club of that city on the evening of January 2. In addition to the usual features of a reception several short addresses were made by prominent wholesale merchants; among them R. A. Kirk of Farwell, Ozmun, Kirk & Co. The following extract from the address of Mr. Kirk on "The Indispensability of the Traveling Salesman" will be of interest:

Is the traveling salesman now a necessary factor in the wholesale business? There was a time, and that not long ago, when he was not indispensable; in fact, he was not "in it." Only one generation back of my day saw the retail merchant make his annual or semi-annual trip to Chicago, or generally then to New York or Philadelphia, to buy his stock. Men who are now living have told me, and it was a very interesting story, of their early experience in those first days of the commercial traveler in breaking the virgin soil of trade in Minnesota

and Western Wisconsin, and in trying to induce traders to give them an initial order. The description of their crude outfits in the way of a few samples, without catalogues or anything of what we now consider the necessary accessories of the trade, was not only interesting but also amusing, and not less so was their experience in making their trips between points, and also in the primitive entertainment at most of their stopping places. It was a rough, hard life and certainly not a promising beginning for methods of business that were destined to change completely the customs of trade that had been followed through the preceding generations. But only a few years were necessary to make the change and, behold, a swarm of traveling salesmen were on the road. This is the condition to-day—the only exception being a few mail order or catalogue houses that have come into the field. If you ask whether the traveling salesman is now indispensable, I answer, "Yes, under present conditions," and so far as can now be seen, he promises to continue to be indispensable.

TO DISPENSE WITH THE TRAVELING BUSINESS MAN

would mean either (or both) that the mail order department must take his place or that the customer shall come in person to the city of his choice and make his purchases. The swing of the pendulum is not in this direction. The fully equipped, down to date commercial traveler now carries to the door of the retail merchant all necessary samples of the articles that he sells, whether it be dry goods, hardware, groceries or other goods, and so enables the customer to order as intelligently and satisfactorily in most cases as he could do if he were to visit the house. The salesman calls on the customer frequently and regularly, and if he is made of the real stuff and if the customer is one who responds to intelligent, tactful treatment, very friendly relations may reasonably be expected to grow up between them. A very large part of the customers of one of our large wholesale houses know but little personally even of the head of the house or of the principal subordinates, but every two or three or four weeks, as the case may be, the salesman calls and a close acquaintance is kept up and constant opportunities are given him to strengthen his position at every visit.

TWO AXIOMS.

I believe in two axioms in the commercial business of to-day. First, that the legitimate and economical method of distributing merchandise is from the manufacturer to the jobber, from the jobber to the retail dealer and from the retail dealer to the consumer. My second axiom is that in the distribution of his goods, the jobber finds the traveling salesman indispensable. If indispensable, then how necessary that our salesmen, as a body, shall fitly represent their respective houses. In honesty, in veracity, in personal habits, in all that makes up the best type of manhood and business character they should stand as the very embodiment. "I am a Roman citizen" was the proud claim in the olden time of those who had given their allegiance to the Roman Eagle. There is for you, gentlemen, a much higher claim—that you are Twentieth Century American traveling business men who have been intrusted by your respective houses with their interests and largely with their destiny.

BUT LET NO ONE OF US

think that because his class is indispensable he is necessarily so individually. The fact is, none of us is indispensable, whether at the head of the house or of the department or holding a high rank on the road. It is not always a pleasing thought to us, but in the economy of things it is certainly true (and it is a wise arrangement of Providence) that the place of every one of us can be filled, not always perhaps so well filled, but filled in some fashion and in such a way as to enable the business world to jog along. Our ideal and our great aspiration, however, should be with each of us, in our respective places, to make ourselves as nearly indispensable as we can. To reach this our inspiration should lead us—if an errand boy in the house, to be the best one on the floor—if the head of the house, to stand the equal of any man on the street, and for the salesman on the road to make his place at the head of the list of commercial travelers.

TRADE ITEMS.

JOHN A. GREGG, manufacturers' agent, Burlington, Iowa, has issued a handsome booklet giving a list of lines that he handles, together with the names of firms whose agent he is in that territory. This material is contained on the left hand pages of the book, right hand pages throughout being reserved for memoranda.

CLAUDE FARNSLEY, for many years connected with the buying department of Belknap Hardware & Mfg. Company, Louisville, Ky., resigned January 1 to take the position of buyer with Knight & Wall Company, Tampa, Fla., and Havana, Cuba.

TOPPING BROS., 92 Chambers street, New York, have leased the entire building at 122 Chambers street, containing five floors and two basements, each 25 feet wide and running through the block to Warren street, from May 1 next. They will occupy it as soon thereafter as the extensive repairs necessary to fit it for their large stocks of Heavy Hardware and Ship Chandlery permit. The growth of their business compelled this move and it will enable them to concentrate everything in one building, all of which they will occupy, instead of having a detached warehouse, as at present.

F. HERBERT SMITH, who has for the past year acted as President and General Manager of the Etna Mfg. Company, 253 Broadway, New York, resigned on December 31. R. F. Manning has been elected as his successor. Beginning January 1, this company discontinued the sale of Taps, Reamers, Dies and Hack Saw Blades, and are now devoting their entire attention to the manufacture of their line of high grade Twist Drills.

M. W. FAITOUTE, formerly with the American Iron & Steel Mfg. Company, and later with the Marine Engine & Machine Company, has recently been appointed treasurer of the Augustin Fuller Company, 35 South William street, New York, who are large manufacturers and exporters of Sugar Machinery for the Cuban trade.

THE business formerly conducted by Ober Mfg. Company, a partnership, Chagrin Falls, Ohio, will be continued by the Ober Mfg. Company, a corporation, who have been organized under the laws of the State of Ohio. The company are manufacturers of Sad Irons, Lathes, Sanders, Shapers, Chucks, Countershafts, &c.

CHAS. REINKE, formerly president and manager, and Wm. Shirray, formerly vice-president, of the Voelkner & Reinke Mfg. Company, have organized the Reinke & Shirray Mfg. Company for the manufacture of Special and Staple Hardware, Dies and General Stamping. The company's plant is located at the intersection of Beecher avenue and M. C. R. R., Detroit, Mich. Mr. Reinke is president, Mr. Shirray secretary and treasurer and H. G. Lyle vice-president. The company refer to their years of practical experience in this line of manufacture, and to their new and up to date plant.

JOHN D. BETHEL has been engaged to represent the Hopkins & Allen Arms Company, Norwich, Conn., in the South during 1904.

THE J. M. CARPENTER TAP & DIE COMPANY, Pawtucket, R. I., are rearranging and improving their sets for the 1904 trade. No new sizes are being added, but the rearrangement will add materially to the company's lines of Taps and Dies.

J. H. VAN NEWKIRK, formerly manager of the Philadelphia branch of the Russell & Erwin Mfg. Company, is now manager of their New York house, succeeding Edward Meyer, second vice-president and manager, who withdrew January 1 to organize the Meyer & Cherry Company, 26 West Twenty-sixth street, New York, now the New York representatives of the Chicago Hardware Company.

E. B. BRINKER of the firm of Neal & Brinker, dealers in Hardware, 18 Warren street, New York, sailed for Europe on the "St. Louis," January 9, on a combined business and pleasure trip which will include Great Britain and such leading continental centers as can be covered in a six weeks' stay.

The Penn Shovel Works, at Corry, Pa., whose plant was destroyed by fire last week, advise us that they will rebuild, but are not sure as to the location. They will probably remove from Corry and rebuild the plant at some other point.

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BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE, }
NORFOLK ST., LONDON, W. C., December 23, 1903. }

The British Tin Plate Trade.

A report on the condition of the tin plate trade by Daniel Laybourn & Co. of Liverpool says that there has been active buying of tin plates during the last few days, and this, with the advance in tin, has helped to put up prices about 3 pence per box. They consider that the market is still in favor of buyers, as prices are abnormally low; the low prices have been brought about by the despondent view taken regarding the demand for tin plates next year. Some fear that there will be a shortage of orders, and advantage has been taken of this view to force down prices. It is, however, noteworthy that although the output at present is very heavy, it is all being taken for actual consumption, stocks generally being light; and if the consumption is heavy in admittedly bad times like the present, it seems reasonable to expect a very good demand in ordinary times, as new uses for tin plates are constantly being found.

Canadian Commercial Representatives.

Those interested in developing American export trade would do well to watch closely the action of the Canadian Government in appointing commercial representatives in various commercial centers, not only in Great Britain, but in the colonies. For example, I observe that James J. Jardine, the Canadian Government representative, has left Capetown on his way to Canada, where he will spend six months interviewing manufacturers and exporters generally. He returns to South Africa about June of next year. There are also Canadian representatives in Australia, France, the West Indies and Japan. In this country agents have been appointed to Birmingham and London, and now comes a third in the person of P. B. Macnamara, who has taken up his official quarters at 94 Market street, Manchester. His work is to consist in inquiry and the stimulation of trade in this industrial center. He is not concerned with emigration; his sole object is to promote commerce between Canada and Great Britain. His appointment is made by the Trades and Commerce Department of the Canadian Government, under the direction of Sir Richard Cartwright. The spirit in which P. B. Macnamara has gone about his work is shown in an interesting interview given to the leading paper in Manchester, from which I transcribe the following excerpt:

My mission, you may take it generally, is one of inquiry and negotiation. I shall endeavor to find out, for instance, if there is any article manufactured in this great city or in the important district of which it is the centre, which has not already found a place in our Canadian market. In such case I shall put the producer here in communication with likely customers in Canada. On the other hand, a Canadian manufacturer whose article has had no sale in England will be put in communication, say, with a Manchester firm. Of course I have nothing to do with the selling of the article of any individual producer. I am the medium of communication simply. I hope, however, and the experience already gained by my Department justifies the expectation, that the result will be to bring about a considerable amount of new trade.

The C. O. D. System.

I have remarked more than once that the proposed "Cash on Delivery" system, which the Post Office is thinking of adopting, is likely to be opposed by the retail trade on the general grounds that it tends to strengthen the position of the large catalogue houses. All retailers, however, are not of one opinion. Thus the retail point of view is given by a well-known London tradesman, who writes:

"The small tradesmen would especially benefit by being able to deliver goods, even miles away, in response to a postcard order from customers. He could, indeed, compete on equal terms with the 'co-operative' stores and avoid bad debts. Great Britain is almost the only country who do not carry goods and collect cash on delivery on behalf of the sender. In nearly all other countries, including our own colonies, the 'C. O. D.' has been a success for many years, and an immense boon to the public and to the trader. As an evidence of the trader's

view of the subject, I may mention that ten years ago the *Gentlewoman* sent a petition to the then Postmaster-General which contained the signatures of 2860 shopkeepers in favor of 'C. O. D.' Such a system, having worked successfully in the British colonies and in almost every European country, would be equally a boon to the public as well as to the trader in Great Britain, and a protection to both against fraud. To the public, because under the system they need not pay for goods until actually delivered; and to the trader, because the cash value for his goods would be insured."

Germany and the St. Louis Exposition.

The sum of 2,000,000 marks has been voted in the estimates for 1904 as a second installment of the State contribution toward securing the representation of the German Empire at the St. Louis World's Fair, making, with the 1,500,000 marks already voted, a total of 3,500,000 marks, or £175,000. A memorandum submitted to the Reichstag states that the German Building is being erected upon the best site in the exhibition grounds, and recommends that exact reproductions should be made of distinctive rooms which have been, or are being, designed and decorated to the order of various public bodies, and that these should be used for the display of the exhibits. The working of the German educational system, both in its technical and intellectual branches, will receive practical illustration upon a large scale, and special prominence will be given to the advance which has been made in the construction of Auto-Motor Vehicles. While German industrialists and merchants are conscious of the disadvantage at which German staple exports are placed by the American system of protection, they base great hopes upon the development of the artistic, or, as they might perhaps be designated, the semi-artistic handicrafts. American production is largely confined to the endless repetition of the same article, whether it be an oleograph or a section of a machine, and the Germans believe that there is a large class of purchasers in the United States to whom their products in the decorative arts and such articles as artistic furniture will appeal.

Forthcoming Exhibitions.

A universal and international exhibition is to be held in Liege, Belgium, in 1905, at a date coinciding with the seventy-fifth anniversary of the independence of Belgium, which bids fair to be on quite a large scale, and is therefore worth the attention of American manufacturers. It will include an international saloon of works of art, mediæval and modern, educational, metallurgical machinery and electrical sections, as well as manufactures of every description. Strong efforts are being made to induce British manufacturers to be represented in large numbers.

The Capetown Exhibition, particulars of which I have already forwarded, has been the subject of discussion at the Birmingham Chamber of Commerce. A question was put as to whether this exhibition was a private speculation, and the answer was that it was believed to be got up by a company. A member of the Chamber expressed the opinion that the Birmingham Chamber of Commerce ought not to be associated with a private speculation. None the less, the matter has been referred to the General Purposes Committee. Arthur F. Dale, the secretary and managing director of the Exhibition Company, is at present in this country, and has been urging the Lord Mayor of Birmingham to call together a meeting of manufacturers to consider the question. The Lord Mayor very discreetly turned over the matter to the Chamber of Commerce.

OIL HEATER WINDOW DISPLAY.

TEETERING Oil Heaters are the attraction in the show window of Duffy Bros., Pawtucket, R. I. An ordinary ready made Teeter, such as is sold for children, is utilized. A large Oil Heater is placed on either end and a smaller one in the middle, as a "straddler." The motive power is a motor placed beneath the window floor, connected with each Teeter end by a cord running up through a hole. The effect is striking.

Correspondence.

The West and Its Prospects.

To the Editor: Your review of the general market in your issue of December 24, under the heading of "Condition of Trade," especially the following paragraph, "There is, however, a better feeling in the East than was found a few months ago, and the West and South remain confident in the anticipation of an excellent trade in the opening months of 1904," was very interesting. Being in close touch with the conditions in the West, your readers may be interested in a view that has been brought about by close observation of these same conditions.

The prosperity that prevails throughout the entire Middle West is of such a nature that I believe the entire country will look to that section during the next few months for the bulk of its trade, the manufacturer especially, because the Eastern buyers are only placing small orders that just keep their supply a little ahead of their wants, while the Western buyer is placing the same amount of business he did last year, and in many cases buying a little heavier. For a while the reports of huge financial losses credited to a certain street in New York City couldn't help but have its affect on the Western merchant, but after looking matters squarely in the face, and realizing that the only thing that could affect his business very much was a complete crop failure, and not a stock failure, he turned on the "sand" and continued on the even tenor of his way. Then the crop reports began to come in, and this has made him more confident than ever that his "Eden" was located in the West. To illustrate—the crop of one of our poorest States (in bygone days) and a State which some people still believe produces only mortgages and cyclones, is valued at \$234,000,000, or \$8,000,000 more than any crop in the past few years, and they have had seven years of plenty. It might be interesting to note that this same State now has nine jobbers in the Hardware line, some of them still retaining their retail departments, but nevertheless, all doing a good business and keeping from three to 15 salesmen employed. These same people have not been in a hurry to sell their crop, as they are in a prosperous condition, and then it has been hard to obtain cars in which to move it, but this will be taken care of before the spring months reach us, and it will be this influence of money that will keep our Western merchants busy for the first few months of 1904, and make it hard for them to keep their stocks, though they are beginning to realize this and are placing their spring orders accordingly.

An argument used recently, but not original with myself, makes this all the stronger. We have in the United States some 80,000,000 people, the large cities, from New York to San Francisco, having only about 20,000,000 people, leaving a balance of some 60,000,000 people for the smaller towns, cities and rural districts. As the latter have not been affected by the speculation in stocks and industrials and are in good condition from the past year's crop and the years preceding, we will naturally look to them for a great portion of the first business of the coming year, and the majority of these people are in the Middle West. Lucky West!

A. C. McKINNIE.

INSTRUCTION FOR TRAVELING SALESMEN.

HIBBARD, SPENCER, BARTLETT & CO., Chicago, devoted part of the first week of the year to what might be called a school for traveling men. As many as possible of their men were brought in from the road and met each day at the headquarters, where they listened to addresses and instructions by heads of departments, members of the firm, buyers, and by manufacturers who gave practical demonstrations of their lines. The opening address was by W. H. Bartlett, the newly elected president of the company, followed by Secretary Graves and by heads of each department in turn, even the heads of the shipping department and packing department hav-

ing their word of suggestion and advice to give. Manufacturers were invited to make practical demonstrations of their Tools, and among those who responded were the following: Dana & Co., manufacturers of Ice Cream Freezers; Landers, Frary & Clark, Universal Bread Maker; the Chicago Flexible Shaft Company, Sheep Shearing Machines; the Clyde Cutlery Company, Butcher Knives. Guns, Rifles and Pistols were demonstrated by the J. Stevens Arms & Tool Company, the Marlin Fire Arms Company and the Savage Arms Company. I. E. Palmer described the method of weaving his patent Hammock. The Graphophone Company presented a new type of Phonograph with a noiseless motor, and the Gifford Mfg. Company demonstrated their Razor Strops. These demonstrations occupied January 5 and 6, the morning of the 6th being occupied by such salesmen as desired it by a tour through the Pitkin Paint Factory, for the products of which Hibbard, Spencer, Bartlett & Co. are now sole distributors. Altogether during the two days' sessions there were 27 addresses and demonstrations. Luncheon was served at noon of each day.

CALENDARS, &c.

ASPHALT READY ROOFING COMPANY, 136 Water street, New York. Monthly hanger calendar.

ECLIPSE MACHINE COMPANY, Elmira, N. Y.: Photogravure mount in the interest of their Morrow Coaster Brake for Bicycles.

JOHNSTON HARVESTER COMPANY, Batavia, N. Y.: Yearly hanger calendar.

AMERICAN SCREW COMPANY, Providence, R. I.: Monthly hanger calendar.

L. & I. J. WHITE COMPANY, Buffalo, N. Y., manufacturers of Machine Knives and Edge Tools: Handsome metal match safe.

NORTHWESTERN MALLEABLE IRON COMPANY, Milwaukee, Wis.: Attractive hanger, presenting a view of their extensive plant.

H. E. STERN, Hardware merchant, Morristown, N. J.: Monthly hanger calendar.

TIPPETT & WOOD, general contractors in Iron Work, Phillipsburg, N. J.: Monthly calendar with thermometer attached.

THE INGERSOLL-SERGEANT DRILL COMPANY, 26 Cortlandt street, New York: Monthly hanger calendar.

GEORGE M. NORTH, Lamson & Sessions Company, Cleveland, Ohio: Monthly hanger calendar.

THE WHITMAN & BARNES MFG. COMPANY, manufacturers of Agricultural Implements, Twist Drills, Wrenches, &c., 111 Chambers street, New York: Monthly hanger calendar.

TROY NICKEL WORKS, manufacturers of Alaska Stove Hardware, Albany, N. Y.: Diary and memorandum book for 1904.

McCULLOUGH-DALZELL CRUCIBLE COMPANY, Pittsburgh, Pa.: Monthly hanger calendar.

THE HOLTZER-CABOT ELECTRIC COMPANY, Brookline, Boston, Mass.: Monthly hanger calendar.

JOHN LUCAS & Co., manufacturers of Paint, Philadelphia, Pa.: Monthly hanger calendar.

THE BRIDGEPORT CRUCIBLE COMPANY, Bridgeport, Conn.: Monthly hanger calendar.

PITTSBURGH METER COMPANY, South Pittsburgh, Pa.: Monthly hanger calendar.

H. G. CORMICK, Hardware merchant, Centralia, Ill.: Monthly hanger calendar.

SABINE MACHINE COMPANY, Montpelier, Vt.: Monthly hanger calendar.

SAVAGE ARMS COMPANY, Utica, N. Y.: Monthly hanger calendar.

W. C. HELLER & Co., manufacturers of Steel Hardware Shelf Boxes, Montclair, N. J.: Unique advertising card, intended to be used as a barometer.

T. C. Nolan, formerly of Hartland, Minn., has purchased the Hardware stock heretofore carried by W. D. Marvin, Pine Island, Minn.

UNITED STATES HARDWARE MFG. COMPANY.

THE organization of the United States Hardware Mfg. Company is announced, the location of their plant, which will be an extensive one, being at Port Clinton, Ohio. The company will manufacture Harness Hardware of all kinds, also Light Hardware. They control, we are advised, 116 patents covering the process of electric welding, as well as additional patents on the articles themselves and on the special machinery required for producing the same. Geo. F. Eberhard of San Francisco, president of the Geo. F. Eberhard Company of that city, and formerly superintendent of the Eberhard Mfg. Company, Cleveland, is prominently identified with the new enterprise.

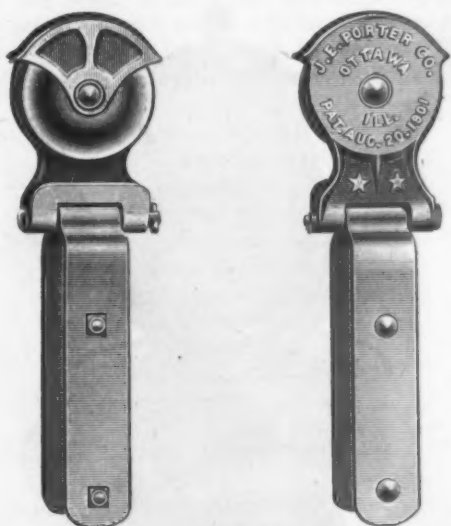
MISCELLANEOUS NOTE.

Standardized Coach Screws and Diamond Expansion Shields.

The manufacturers named below are now in unison on coach screws with respect to the number of threads per inch on the diameters named, which are most used in connection with the Diamond expansion shields made by the New Jersey Foundry & Machine Company, 15 Murray street, New York—viz., American Iron & Steel Mfg. Company, Buffalo Bolt Company, W. H. Haskell Mfg. Company, Hoopes & Townsend, Lamson & Sessions Company, Oliver Iron & Steel Company, Pawtucket Mfg. Company, Pottsville Bolt Company and Upson Nut Company. Through the medium of more or less changes by most of the companies referred to and some modifications in the shield, coach screws hereafter of the above makes will fit this shield, the standard threads being as follows: 5-16-inch diameter, 9 threads per inch; $\frac{3}{8}$ -inch diameter, 7 threads; $\frac{1}{2}$ -inch, 6 threads; $\frac{5}{8}$ -inch, 5 threads, and $\frac{3}{4}$ -inch diameter, $4\frac{1}{2}$ threads per inch. Dealers ordering coach screws in the future designed for use with this shield are advised to specify screws with these threads until stock already made is exhausted, when all stocks will be alike, whether for this or any other purpose.

Porter's New No. 2 Hinged Barn Door Hanger

The hanger shown herewith is made of malleable iron, ribbed in such a manner as to gain the maximum strength. The strap is fastened to the hanger by means

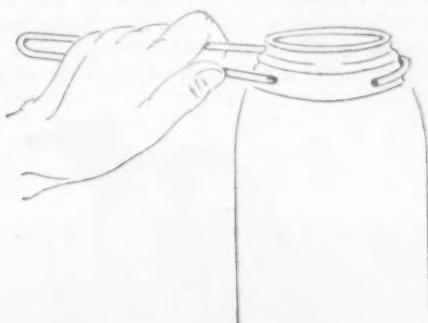


Porter's New No. 2 Hinged Barn Door Hanger.

of a malleable pin, so that the door can be attached or detached without disturbing the hanger. The flange that forms the "can't get off" feature extends the full length of the hanger. The hangers run on roller bearings, and are packed one pair in a box, and in cases containing one-half and one dozen pairs. The hanger is offered by J. E. Porter Company, Ottawa, Ill.

Perfection Jar Wrench.

William H. Lore, 1441 Mayfield street, Philadelphia, Pa., is offering the jar wrench shown herewith. It is made of heavy wire, the shorter end of which is beveled



Perfection Jar Wrench.

so as to prevent a sharp edge to the cap of the jar. The device is simple in construction and its durability is emphasized by the manufacturer.

Mosquito Canopy Bedstead Support and Clamp.

I. E. Palmer, Middletown, Conn., is putting on the market the mosquito canopy bedstead support and clamp shown herewith. The clamp is designed to be attached



Fig. 1.—Mosquito Canopy Bedstead Support.

to either vertical or horizontal rods, and consists of two threaded hooks with a pinch piece, cap and thumb nuts. The threaded hooks, by means of the thumb nuts, hold the

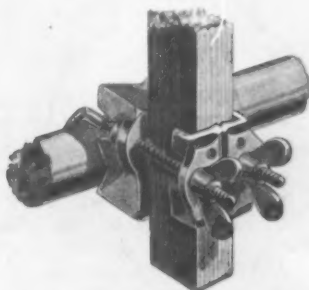


Fig. 2.—Clamp for Canopy Bedstead Support.

pinch piece against the bed rod, and at the same time hold the cap clamp against the support rod, retaining it in any desired position.

New Simplex Wall Paper Trimmer.

Front and rear views are given herewith of a new wall paper trimmer, put on the market by the Webster & Perks Tool Company, Springfield, Ohio. All parts, except the main frame, are made of steel and hardened, insuring, it is remarked, the machine cutting true to the straight edge at all times, even after years of service. The leverage in the trimmer is obtained by means of a

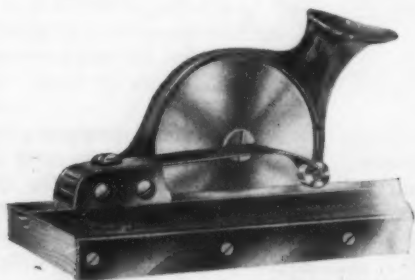


Fig. 1.—New Simplex Wall Paper Trimmer.

fulcrum, and is referred to as being largely in excess of other trimmers, thus enabling the operator to cut with the greatest ease and least pressure and fatigue, a greater number of thicknesses of plain and fancy wall papers, burlap, Lincrusta Walton, &c. It is pointed out that there is practically no friction of the trimmer on the straight edge when cutting, as there are but two points of contact covering a surface of but $\frac{1}{8}$ inch, and that with its great leverage the pressure required to cut even the heaviest material is reduced to a minimum. Another advantage of the trimmer is shown to be that it ad-



Fig. 2.—Paper Trimmer in Operation.

heres closely to the straight edge at all times, and cannot be thrown or shaken off even should the straight edge be placed in a vertical position, although the trimmer can be instantly removed when desired. Each trimmer is highly polished and nickel plated, and packed in a cardboard box. In this connection the company have established what will be known as the trimmer department, in which they manufacture a line of paper hangers' tools, consisting of the trimmer described, straight edges, seam and smoothing rollers, paste tables, &c.

The X-Radium Heater.

Novelty Mfg. Company, Jackson, Mich., are offering the heater shown in the accompanying cuts. It consists



Fig. 1.—The X-Radium Heater.

of two parts: the heating pad filled with X-Radium, shown in Fig. 2, and the stamped steel bowl shaped stand, Fig.

3, with an asbestos mat in the bottom, in which the pad is placed after being heated. X-Radium is referred to as a substance possessing a natural affinity for heat and as quickly gathering to itself the heat rays in apparently unlimited volume and retaining them for a long time.



Fig. 2.—Heating Pad.

The pad is placed on a stove or range while the meal is being prepared. It is stated that the amount of heat which the pad will absorb in 20 minutes will be enough to keep coffee, &c., hot for two hours. It is also used for keeping hot vegetables, meats, pancakes, waffles, &c.



Fig. 3.—Bowl Shaped Stand.

In Fig. 4 is shown the manner in which the heater is used. Both parts of the heater are finely finished, polished and heavily nickel plated, making a handsome and ornamental addition to a dining room equipment. It is pointed out that wherever a hot water bag is used the heater can take its place and give better results, as it is



Fig. 4.—X-Radium Heater in Use.

easy to handle, gives a greater volume of heat, retains it longer and can be heated to give a certain degree of temperature. The heater may also be used to advantage as a foot warmer.

Stanley Miter Box.

The Stanley Rule & Level Company, New Britain, Conn., and 107 Chambers street, New York, have recently put on the market an important addition to their lines, in the form of the Stanley miter box, here illustrated, which

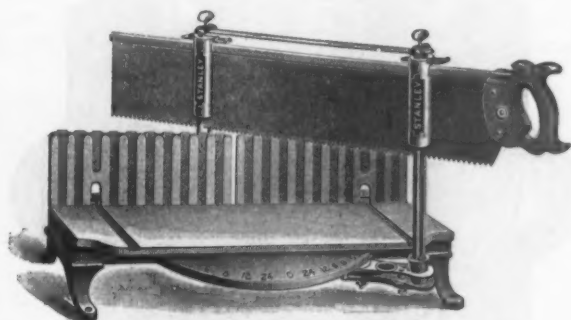


Fig. 1.—Stanley Miter Box, Complete with Saw.

they offer as a construction on entirely new lines and possessing special features. Some of its characteristics are that the saw is sustained above the box when not in use; swivels automatically and locks at any angle; there are two sockets in swivel for use of a long or short saw, and a narrow opening in back of frame, especially suit-

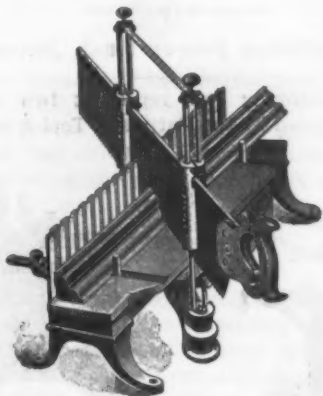


Fig. 2.—Stock Guides Holding Molding.

able for sawing small work. The uprights for saw guides are steel rods, and there are stock guides for holding the work in place, an especially valuable detail, as seen in Figs. 2 and 3, showing a strip of straight and circular molding held rigidly for cutting. The box has a wide range of work, which can be mitered at an

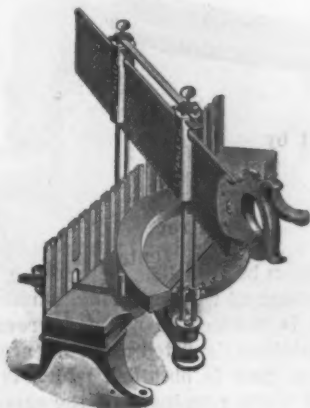


Fig. 3.—Stock Guides Holding Circular Work.

angle of 30 degrees. The frame is of one piece, with detachable malleable iron legs. The mechanical details of construction are well worked out, and all the parts are interchangeable for renewal, if necessary. It can be quickly and readily taken apart or reassembled for convenience in carrying about. The saw suspended above

the work, as seen in Fig. 1, can be instantly dropped for use by a slight pressure of the thumb of the hand using the saw on the spring actuated lever above the saw. The swiveling table is graduated at various angles for cutting from either side, with holes to receive a holding pin; but for special work the angle can be instantly fixed at any point within the extremes by simply revolving the table and releasing the finger pressure on the underneath mechanism. Fig. 1 shows the miter box complete with saw, Fig. 4 representing it knocked down for carrying or shipment. It is listed in five numbers, furnished with back saws, made especially for this box by Henry Disston & Sons, although the box can be sup-

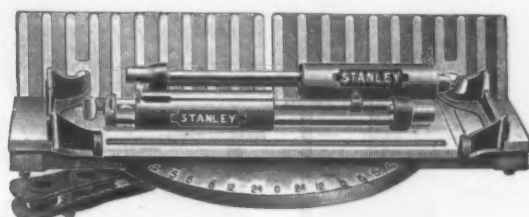


Fig. 4.—Miter Box Knocked Down.

plied without saw if so ordered. The saws, with 4-inch blades, are 22, 24 and 26 inches in length, one box being fitted with a saw 28 x 5 inches. The miter capacities at 45 degrees are variously 5½ and 6½ inches, the right angle capacity ranging from 8¼ to 9½ inches, inclusive. The capacity at 30 degrees without stock guides is from 3½ to 4½ inches, inclusive.

Wolf Air Drill Coupling.

The Boston Woven Hose & Rubber Company, Cambridge, Mass., are manufacturing the new air drill

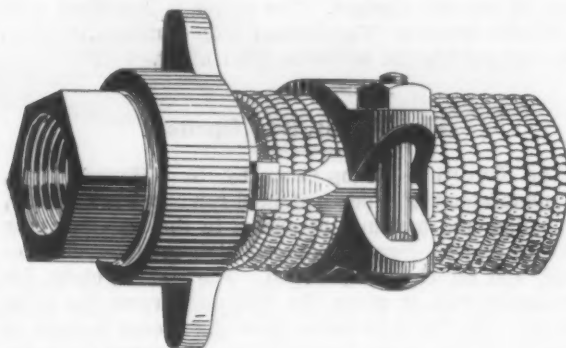


Fig. 1.—Wolf Air Drill Coupling.

coupling, shown herewith. The device consists of a malleable iron clamp, Fig. 2, held with Swedish iron bolts and beveled brass pieces placed under the clamp at the junctures, which make a perfect contact with

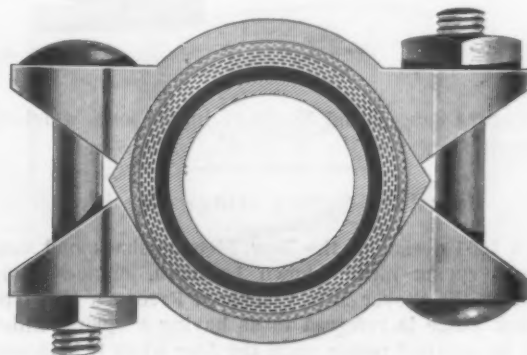


Fig. 2.—Sectional View of Coupling.

every part of the hose. The beveled pieces attach to a collar piece on the tail, back of the swivel. All parts but the clamp are of brass.

Boyer's Gliding Settee.

The gliding settee shown herewith is made from choice, seasoned lumber. The base and foot boards are painted a bright red, and the remainder of the settee is nicely finished in natural wood. It occupies a floor space of 3 x 6 feet, and separates into eight parts without removing a bolt or screw. Its entire weight is a little over 100 pounds. It is pointed out that this device has a level, gliding motion, which will not cause a dizzy sensation to the most delicate person. By removing the



Boyer's Gliding Settee.

center section of the foot board, turning its upper side downward, placing it between the seats and lowering the backs of the seats, a very comfortable bed may be formed, and with the addition of a mattress, it is stated, the shape it assumes is most inviting and restful, particularly to the convalescent. The settee is furnished with or without awning. The Goshen Mfg. Company, Goshen, Ind., are putting the settee on the market.

The Mellor Box Opener.

The Kilborn & Bishop Company, New Haven, Conn., are manufacturing a new patented combined box opener, nail puller and hammer, as shown in the accompanying cut. It is drop forged, made of high grade steel, tempered, and the claw is polished. The makers claim for the opener that it saves the lids and draws the nails straight. In Fig. 2 is shown how the opener is used to pry open the box, drive down the lid and remove the nails. The tool is made in two sizes: No. 1, 14 inches long,



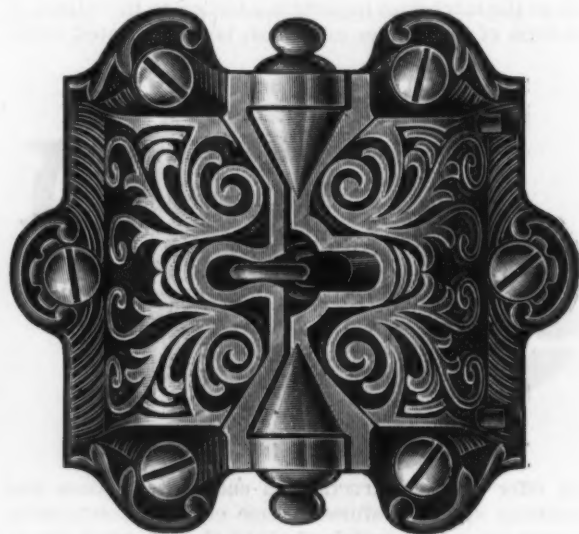
The Mellor Box Opener.

weighing 24 ounces, and No. 2, 11 inches long, weighing 14 ounces.

New Idea Spring Hinge No. 17.

The 1904 design of the New Idea holdback and non-holdback spring hinge, shown herewith, is now being offered by the Stover Mfg. Company, Freeport, Ill. The holdback hinge is referred to as having a spring which exerts its greatest power upon the door when it is closed. The manufacturers remark that the spring will not break or weaken, as it is never overstrained and its action is free and easy. The non-holdback hinge is made without adding to or taking from the construction of the No. 17, so, it is explained, that it closes the door from all

points and is guaranteed equally as efficient and durable as the holdback hinge. Both hinges will be supplied in all finishes, packed ½ dozen pairs in a carton, ½ gross in a case, or one pair in a box with trimmings, as or-

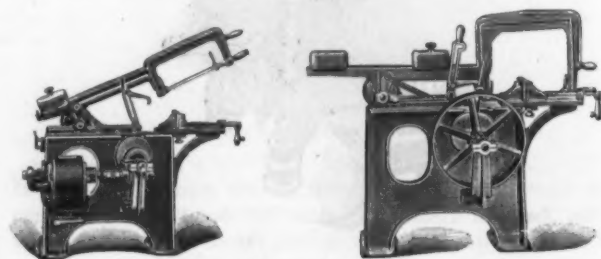


New Idea Spring Hinge No. 17.

dered. Mounted samples will be sent free on application to the manufacturers.

Challenge Power Hack Saws.

The accompanying cuts represent two power hack saws manufactured by the Patterson Tool & Supply Com-



No. 1.

No. 2.

Challenge Power Hack Saws.

pany, Dayton, Ohio. The saw, No. 1, has a direct connected ¾ horse-power electric motor. The capacity of

the machine is 6 x 6 inch, but by substituting a higher arm, 6 x 12 inch can be cut. The motor is high speed, and through the medium of worm gearing, running in an oil case, the speed is reduced to about 50 revolutions per minute. The machine is fitted with a patented device by which a force feed is obtained which is easily and quickly adjusted while running, and the same force that is exerted on the forward and cutting stroke is utilized for relieving the saw from any drag on the return stroke, thereby saving wear and tear on the saw blade.

Saw No. 2 is the company's regular 6 x 6 inch machine, arranged to meet the demand for a saw to cut structural iron 6 x 12 inches. The machine is arranged with the same kind of patented device as the other machine, as described above.

The Hurst Hold Back Spring Hinge.

H. L. Hurst Mfg. Company, Canton, Ohio, are offering the hold back spring hinge shown herewith. The following features regarding the construction of the hinge are alluded to: That the spring is fastened pivotally and so made that it does not tend to break the hinge when putting it on; that the peculiarly shaped double convolution spring affords additional flexibility, acting



The Hurst Hold Back Spring Hinge.

from one end to the other, therefore possessing great elasticity, and that the spring has the same free but positive "home bringing" tension when old as when it is new.

The Williamson Universal Double Swivel Vises.

Williamson Mfg. Company, Bradford, Pa., are offering the vises shown in the accompanying cuts. For fine and accurate work, the manufacturers remark, the vise is invaluable, as sometimes even a shadow on the work will annoy and delay the workman, and that the time saved by having work in a convenient position will soon pay for a new equipment of vises. In operation, by one motion of the hand pulling the lever forward, the jaws can be moved to right or left, up or down, forward or backward. When in the position desired, the lever is pressed firmly backward and the vise is securely locked. When locked, it is stated, the vise is perfectly rigid and

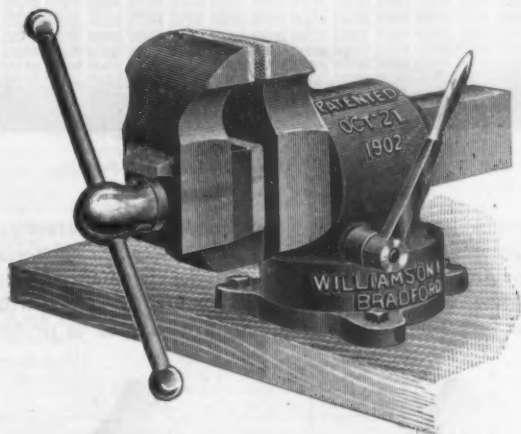


Fig. 1.—The Williamson Universal Double Swivel Vise.

as strong as a solid vise. The combination vise is worked upon the same principle as the machinists' vise. The following points of excellence are referred to by the manufacturers: That the vise revolves upon two distinct complete circles, adjusting itself to any degree of these circles, quickly and positively, by the action of one lever, obviating the necessity of removing the work from

the vise, and giving the operator any angle of adjustment he desires, in either or both of the circles, and that the vise differs from the ordinary swivel vise in that it

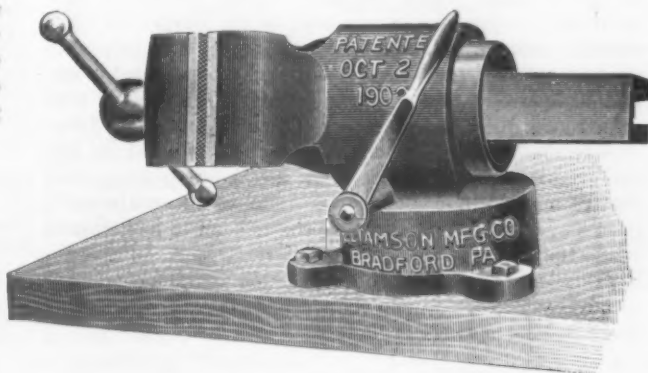


Fig. 2.—One of the Numerous Positions in Which the Vise Can be Revolved.

revolves upon two circles instead of one, practical in both, is more quickly and rigidly adjusted, and simultaneous in its adjustment to both circles. It is explained that the vise is suitable for any industry where vises

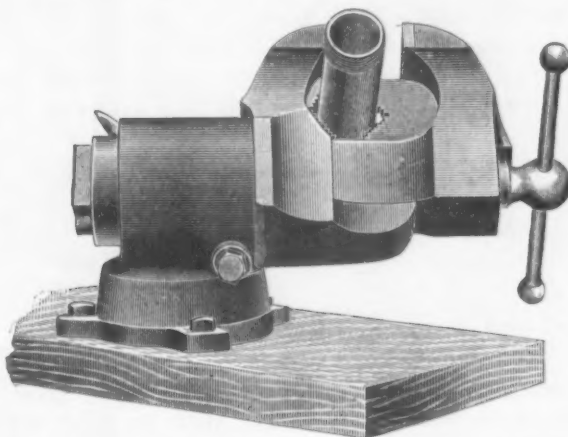
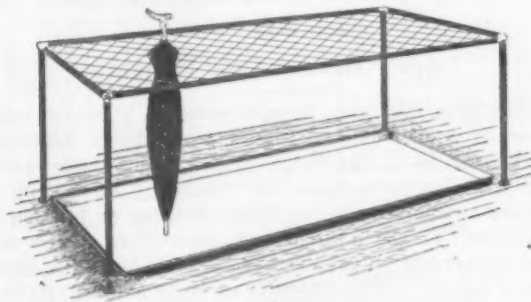


Fig. 3.—The Williamson Combination Gas Fitters' and Plumbers' Vise.

are used, from the small jewelers' vise to the large machinists' vise. The vises are made in seven widths of jaw from 2½ to 6 inches.

Eureka Umbrella Rack.

The umbrella rack herewith shown is constructed of 1-inch galvanized tubing—outside measurement—with hand woven netting, 3 x 5 inch mesh. The rack can be made to hold any number of umbrellas, and of any shape

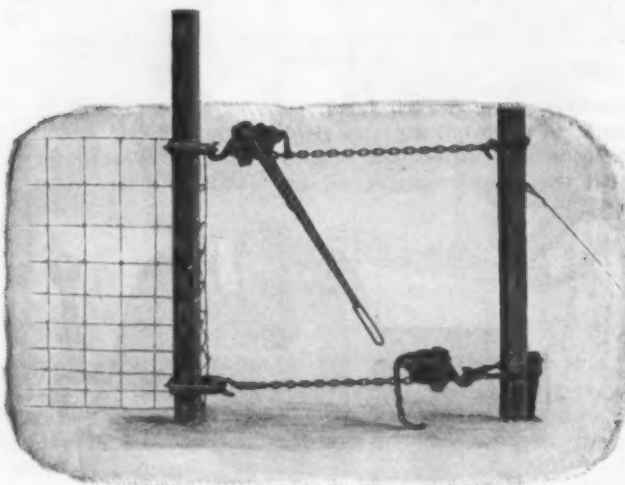


Eureka Umbrella Rack.

desired. If so ordered, hinges take the place of the back legs, so it may be attached to a wall, and be folded flat when not in use. The racks are furnished with or without drip pan, by the Eureka Fence Mfg. Company, Richmond, Ind., and are designed for use in churches, schools, public buildings, &c.

The Royal Fence Stretcher.

The stretcher proper, shown herewith, consists of two independent identical parts. Each carries a chain sprocket wheel, which revolves within malleable side portions, terminating at one side in the compound hook shown. Instead of these wheels carrying and revolving upon a spindle, they revolve upon their extended hubs, and a square hole $1\frac{1}{2}$ inches in the axial portion acts as a recess for the square boss of the 3-foot hand lever or wrench, by means of which the wheel is revolved and the chain passed over it. The malleable portion also carries a pawl that engages the links of the chain as it passes over the wheel, enabling the tension to be retained while the operator transfers the lever wrench to operate the duplicate portion, or to hold the tension independently of any force exerted upon the lever. It is pointed out that there are no springs or delicate parts to become disar-



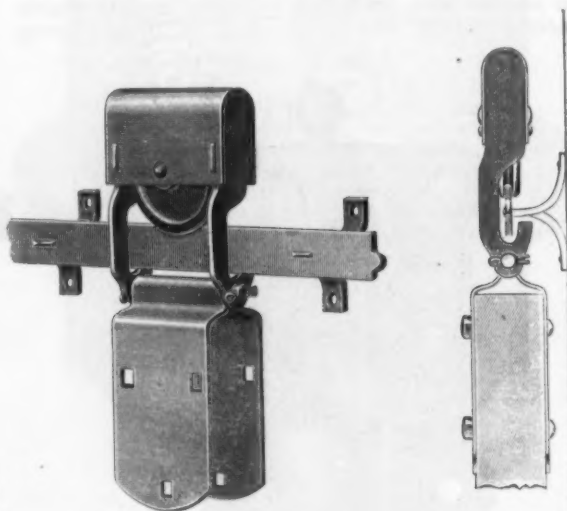
The Royal Fence Stretcher.

ranged or broken, and that the chains are best grade, hand made, tested quality. The clevis to which the stretcher or chains are attached by means of hooks is made in two pieces of malleable iron of such shape that no bolt is used, and yet they can be instantly made to embrace the wood clamps of the usual form, or disengaged as readily and quickly. All the shapes except the wheels and pawls are malleable castings, and not mentioning the clamps, there are but six bolts in the complete outfit. The chains may be made of any length, since the free end pays out of the chain wheel instead of winding around it or a drum, so that the device may be used for lifting heavy loads and elevating them one floor to another, instead of elevators, block and tackle and more expensive hoists. The manufacturers claim that one man can exert 5000 pounds strain upon each portion. The stretcher is made and placed upon the market by the Elliott & Reid Company, Richmond, Ind.

Lane's Hinged Door Hanger.

Lane Bros. Company, Poughkeepsie, N. Y., are offering a new barn door hanger for 1904, as shown herewith. The hanger is of the hinge joint "tied on the rail" variety, and permits some side flexibility at the top of the door to compensate for slight warping or binding of the latter. It has a detachable door piece which will prove convenient in the case of hangers having a guard back of the rail. The wheel is not only covered, as that term is ordinarily understood, but protected at the ends as well. The hanger frame is made entirely of steel and is referred to as being strong, as the supporting strains are nearly direct tension. In suspending the load it is shown that it is carried but a very short distance from the center around the rail, as will be noted particularly by the end view. As the metal is wide in section there is but very little tendency to straighten out at this point,

while the hinged pin itself, on which the clevis is supported, passes through holes in the lower part of the main frame. The clevis is very wide, permitting three bolt holes, that are not in line, and is supported the whole width on the hinge pin, but the clevis is not prevented from rising independently of the hinge pin as far as the underside of the track, therefore, it is remarked,



Lane's Hinged Door Hanger.

jamming a door so that one edge jumps up, cannot strain the hanger. With the hanger the bottom of the door is not only free to swing outwardly on the pivot, but may be raised to a horizontal position, or even higher, if it is desired to use the door as an awning. The wheels are fitted with the regular Lane roller bearings, having a separate bushing for the rollers to run on. The hanger is made in three sizes, for 1, $1\frac{1}{4}$ and $1\frac{1}{2}$ inch rail.

Majestic Hard Steel Galvanized Fencing.

A stock fence, one of the numerous styles of hard steel galvanized fencing, offered by the Majestic Fence Company, Limited, Detroit, Mich., is shown in Fig. 1.

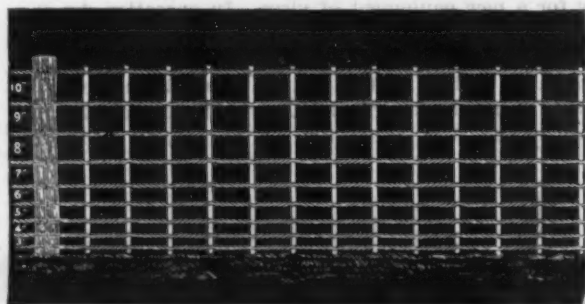


Fig. 1.—Majestic Hard Steel Galvanized Fencing.

The horizontal wires are cabled, made of hard steel and well galvanized, with a reverse twist between each stay to provide amply for contraction and expansion. By the use of the corrugated stay, shown in Fig. 2, $\frac{3}{8}$ inch wide, the manufacturers state that they are enabled to provide



Fig. 2.—Corrugated Steel Stay.

a fence that will stand severe tests and hardships, keep its proper shape and warn stock. The fence illustrated has stays 1 foot apart, and is 52-inch, nine-cable style fence.

Current Hardware Prices.

REVISED JANUARY 12, 1904

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33 1/2, @ 33 1/2, & 10% signifies that the

price of the goods in question ranges from 33 1/2, per cent. discount to 33 1/2, and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued June, 1903, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Abrasives—

Adamite in Carloads: \$ ton \$90@100
Crystall. \$ ton \$120@140
Grain
See also Emery.

Adjusters, Blind—

Domestic, \$ doz. \$3.00.....33 1/2
North's.....10%
Zimmerman's—See Fasteners, Blind.

Window Stop—

Ives' Patent.....35%
Taplin's Perfection.....35%

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—American—

Armand Hammer, Wrought \$ lb. \$8 1/2 @ 8 3/4
Buel Patent Trenton.....\$ lb. \$9 1/2 @ 9 3/4
Eagle Anvils.....\$ lb. \$7 1/2 @ 7 3/4
Ray-Budden, Wrought.....\$ lb. \$9 1/2 @ 9 3/4
Horsehoe brand, Wrought.....\$ lb. \$9 1/2 @ 9 3/4

Imported—

Peter Wright & Sons.....\$ lb. \$10 1/2 @ 10 3/4

Anvil, Vise and Drill—

Millers Falls Co., \$18.00.....15 & 10%

Apple Parers—See Parers, Apple, &c.

Aprons, Blacksmiths'—

Hull Bros. Co.,.....\$30 & 5%

Augers and Bits—

Com. Double Spur.....70 & 10 @ 75%
Boring Machine Augers.....85 & 10 @ 70%
Car Bits, 12-in. twist.....80 & 10 @ 10%
Jennings' Pattern.....50 & 10 @ 60%
Ford's Auger and Car Bits.....40 & 5%
Forsner Pat. Auger Bits.....35%
C. E. Jennings & Co.:
No. 10 ext. lip, R. Jennings' List 25 & 10%
No. 30, R. Jennings' List, 40 & 7 1/2 @ 10%
Russell Jennings.....35 & 10 @ 2 1/2%
L'Honniedieu's Car Bits.....15 & 10%
Mayhew's Counter Sink Bits.....45%
Millers' Falls.....50 & 10 @ 7 1/2%
Pugh's Black.....30%
Pugh's Jennings' Pattern.....35%
Snell's Auger Bits.....60%
Snell's Bell Hangers' Bits.....60 & 10%
Snell's Car Bits, 12-in. twist.....60%
Wright's Jennings Bits (R. Jennings' List).....50%

Bit Stock Drills—

See Drills, Twist.

Expansive Bits—

Clark's small, \$18; large, \$26.....50 & 10%
Clark's Pattern, No. 1, \$ doz., \$26;
No. 2, \$18.....60 & 10%
Ford's, Clark's Pattern.....\$ doz. \$11 @ 60%
C. E. Jennings & Co., Steel's Pat. 25 & 10%
Swan's.....80%

Gimlet Bits—

Common Double Cut, gro., \$3.75 @ 5.00
German Pattern.....gro. \$4.00 @ 4.25

Hollow Augers—

Bonney Pattern, per doz., \$16.00 @ 11.00
Ains.....25 & 10%
New Patens.....25 & 10%
Universal.....20%
Wood's Universal.....25%

Ship Augers and Bits—

Ford's.....40%
Snell's.....40%
C. E. Jennings & Co.:
L'Honniedieu's.....15 & 10%
Watrous.....33 1/2 @ 10%

Awl Hafts, See Hafts, Awl.

Awls—

Brad Awls:
Handled.....gro. \$3.75 @ 5.00
Unhandl'd, Shouldered, gro. 63 @ 60%
Unhandl'd, Patent.....gro. 66 @ 70%

Peg Awls—

Unhandl'd, Patent.....gro. 31 @ 3 1/2%
Unhandl'd, Shouldered, gro. 65 @ 70%
Scratch Awls:
Handled, Common.....gro. \$3.50 @ 4.00
Handl'd, Socket.....gro. \$11.50 @ 12.00
Hurwood.....40%

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

First Quality, factory brands.....\$5.50
First Quality, jobbers' brands.....\$5.00 @ 5.25
Second Quality.....\$4.50 @ 4.75

Axie Grease—See Grease, Axle

Axles—

Concord, Loose Collar.....50 & 5 1/2%
Concord, Solid Collar.....50 & 5 1/2%
No. 1 Common.....50 & 5 1/2%
No. 1 1/2 Com. New Style.....45 & 5 1/2%
No. 2 Solid Collar.....45 & 5 1/2%
Nos. 7, 8, 11 and 12.....60 & 5 @ 60 & 10%
Nos. 13 to 15.....60 & 5 @ 60 & 10%
Nos. 16 to 18.....60 & 10 @ 70%
Nos. 19 to 25.....60 & 10 @ 70%

Boxes, Axle—

Common and Concord, not turned.....lb. 5 1/2 @ 5 1/4%
Common and Concord, turned.....lb. 5 @ 5 1/4%
Half Patent.....lb. 9 @ 9 1/4%

Bait— Fishing—

Headryx.....30%
B Bait.....25%
Competitor Bait.....30 & 5%

Balances— Sash—

Caldwell new list.....50%
Fullman's.....60%

Spring—

Spring Balances.....60 @ 60 & 5%
Chattillon's:
Light Sps. Balances.....40 & 10%
Straight Balances.....40%
Circular Balances.....50%
Large Dial.....30%
Pelouze.....50%

Barb Wire—See Wire, Barb.

Bars— Crow—

Steel Crowbars, 10 to 40 lb., per lb. 3 @ 3 1/2%

Towel—

No. 10 Ideal, Nickel Plate.....\$ gro. \$8.50

Beams, Scale—

Scale Beams, List Jan. 12, '85, 10 & 10%
Chattillon's No. 1.....30%
Chattillon's No. 2.....40%

Beaters— Egg—

Lightning Chain, \$ gro.....\$15.00
National Mfg. Co.:
No. 1 Dover, Family size.....\$7.00
No. 2 Dover, Hotel size.....\$14.00
Taplin Mfg. Co.:
No. 63 Improved Dover.....\$8.00
No. 75 Improved Dover.....\$8.50
No. 100 Improved Dover.....\$7.00
No. 102 Improved Dover, Tin'd.....\$8.50
No. 150 Improved Dover, Hotel, Tin'd.....\$15.00
No. 152 Imp'd Dover, Hotel, Tin'd.....\$17.00
No. 200 Imp'd Dover Tumbler.....\$8.50
No. 202 Imp'd Dover Tumbler, Tin'd.....\$9.50
No. 300, Imp'd Dover Mammoth.....\$25.00
Wander (S. S. & Co.).....\$ gro. net, \$8.00

Bellows—

Blacksmith, Standard List, 75 @ 75 & 5%

Blacksmiths'—

Inch.....30 33 34 36 38 40
Eac'.....\$3.50 3.75 4.25 4.50 5.25 6.15
Extra Length:
Each.....\$4.00 4.55 5.10 5.60 6.40 7.50

Molders—

Inch.....10 12 14
Doz.....\$3.50 10.00 13.00

Hand—

Inch.....6 7 8 9 10
Doz.....\$4.25 4.50 5.00 5.60 7.75

Bells— Cow—

Ordinary goods.....75 & 5 @ 75 & 10%
High grade.....70 & 10 @ 70 & 10 & 5%
Jersey.....75 & 10%
Texas Star.....50%

Door—

Abbe's Bongs.....45%
Barton Gong.....55%
Home, R. & E. Mfg. Co.'s.....55 & 10%
Lever and Pull, Sargent's.....60 & 10 @ 10%
Yankee Gong.....25%

Hand—

Hand Bells, Polished, Brass.....60 & 5 @ 60 & 10%
White Metal.....60%
Nickel Plated.....50 @ 50 & 5%
Swiss.....60 @ 60 & 7 1/2%
Cone's Globe Hand Bells.....\$ doz. \$31 @ 32 1/2%
Silver Chime.....33 1/2 @ 33 1/2 & 10%

Miscellaneous—

Farm Bells.....lb. \$2 @ 2 1/4%
Steel Alloy Church and School.....80 @ 80 & 5%
American Tube & Stamp'g Co. Gongs, 755
Table Call Bells.....50 & 5 @ 50 & 10%
Trip Gong Bells.....35 & 10 @ 60%

Belting— Rubber—

Agricultural (Low Grade).....75 @ 75 & 5%
Common Standard.....70 @ 70 & 10%
Standard.....65 @ 70%
Extra.....60 & 5 @ 60 & 10%
High Grade.....50 & 5 @ 50 & 10%
Boston Belting Co.:
Seamless Stitched Imperial.....45 & 5%
Boston.....50 & 5%
Niagara.....60 & 5%

Leather—

Extra Heavy, Short Lap.....60 @ 60 & 5%
Regular Short Lap 60 & 10 @ 60 & 10 & 5%
Standard.....70 @ 70 & 5%
Light Standard.....70 & 10%
Cut Leather Lacing.....60 & 10%
Leather Lacing Sides, per sq. ft., 18c

Bench Stops—See Stops, Bench

Benders and Upsetters, Tire—

Detroit Perfected Tire Bender.....40%
Green River Tire Benders and Upsetters.....50%
Detroit Standard's Lightning Tire Upsetters, No. 1, \$4.25; No. 2, \$7.25; No. 3, \$10.50; No. 4, \$16.25; No. 5, \$20.50.

Bicycle Goods—

John S. Long's Son's 1902 list:
Chain.....50%
Chairs.....50%
Parts.....50%
Spokes.....50%
Tubes.....60%

Bits—

Auger, Gimlet, Bit Stock Drills, &c.—
See Augers and Bits.

Blocks— Tackle—

Common Wooden.....70 & 10 @ 75 & 5%
Hollow Steel Blocks, with Ford's Patent Beaves.....50 & 10%
Lane's Patent Automatic Look and Junior.....30%
Stowell's Novelty, Mal. Iron.....50 & 10%
Stowell's Self Loading.....60%
See also Machines, Hoisting.

Boards, Stove—

Zinc, Crystal, &c.....50 & 10 @ 40 & 10%

Boils—

Common Carriage.....80 @ 80 & 10%
Phila. Eagle, \$3.00 list May 24, '99.....80 @ 80 & 5%
Bolt Ends, list Feb. 14, '95, 65 & 5 @ 65 & 10%
Machine, list Oct. 1, '99.....70 & 10 @ 70 & 10 & 5%
Machine with C & T. Nuts.....60 & 10 @ 60 & 10%

Boards, Stove—

Zinc, Crystal, &c.....50 & 10 @ 40 & 10%

Boils—

Common Carriage.....80 @ 80 & 10%
Phila. Eagle, \$3.00 list May 24, '99.....80 @ 80 & 5%
Bolt Ends, list Feb. 14, '95, 65 & 5 @ 65 & 10%
Machine, list Oct. 1, '99.....70 & 10 @ 70 & 10 & 5%
Machine with C & T. Nuts.....60 & 10 @ 60 & 10%

Door and Shutter—

Cast Iron Barrel, Round Brass Knob:
Inch.....5 6 8 10
Per doz.....\$0.28 .30 .39 .47 .55
Cast Iron Spring Foot:
Inch.....6 8 10
Per doz.....\$1.00 1.25 1.75
Cast Iron Chain, Flat, Japanned:
Inch.....6 8 10
Per doz.....\$0.75 1.05 1.30
Cast Iron Shutter, Brass Knobs:
Inch.....6 8 10
Per doz.....\$0.57 .80 1.00
Wrt Barrel, Jap'd, 75 & 10 @ 75 & 10 & 10%
Wrought Bronzed, 10 & 5 @ 50 & 10%
Wrought Flush, B. K., 50 & 10 @ 60 & 10%
Wrought Shutter.....10 & 10 @ 10 & 60 & 5%
Wrought Square Neck.....50 & 5 @ 10%
Wrought Sunk, Flush.....50 & 5 @ 10%
Ives' Patent Door.....60%

Stove and Plow—

Plow.....60 @ 60 & 5%
Stove.....30 @ 30 & 10%

Tire—

Common.....75 & 10 @ 75 & 10%
Norway Iron.....80 @ 80 & 5%
American Screw Company:
Norway Phila., list Oct. 16, '94.....80%
Eagle Phila., list Oct. 16, '94.....80 & 5%
Bay State, list Dec. 28, '90.....72 & 5%

Franklin Moore Co.:—

Norway Phila., list Oct. 16, '94.....80%
Eagle Phila., list Oct. 16, '94.....80 & 5%
Eclipse, list Dec. 28, '90.....72 & 5%
Russell, Burdall & Ward Bolt & Nut Co.
Empire, list Dec. 28, '90.....72 & 5%
Norway Phila., list Oct. '94.....60%
Upson Nut Co.:
Tire Bolts.....72 & 5%

Borers, Tap—

Borers Tap, Ring, with Handle:
Inch.....1 1 1/4 1 3/4 2
Per doz.....\$4.30 5.00 6.75 7.25
Inch.....2 1/4 2 3/4 3
Per Doz.....\$8.65 11.50 15.50
Enterprise Mfg. Co., No. 1, \$1.25; No. 2, \$1.85; No. 3, \$2.50 each.....25%

Boxes, Mitre—

C. E. Jennings & Co.....25 & 10%
Langdon.....15 & 10%
Perfection.....\$ doz. \$6.00
Schatts.....40%

Braces—

NOTE.—Most Braces are sold at net prices.
Common Ball, American.....\$1.15 @ 1.25
Barber's.....50 & 10 @ 60 & 10%
Fray's Genuine Spofford's.....40%
Fray's No. 70 to 120, \$1 to 1.25, 207 to 414.....60%
C. E. Jennings & Co.....80 & 5 @ 10%
Mayhew's Ratchet.....60%
Mayhew's Quick Action Hay Patent.....50%
Millers Falls Drill Braces.....25 & 10%
P. S. & W. Co. Peck's Patent 60 & 10 @ 65%

Brackets—

Wrought Steel.....80 @ 80 & 5%
Bradley's Wire Shelf:
Full cases.....85%
Broken cases.....80 & 10 @ 10%
Griffin's Pressed Steel.....80%
Griffin's Folding Brackets.....70 & 10%
Stowell's Cast Shelf.....75%
Stowell's Sink.....50%

Bright Wire Goods—See Wire and Wire Goods.

Broilers—

Wire Goods Co.....75 @ 75 & 10%

Buckets, Well and Fire—

See Pails

Bucks Saw—

Hoosier.....\$ gro. \$38.00

Bull Rings—See Rings, Bull.

Butts— Brass—

Wrought list Sept., '96.....30 @ 30 & 5%
Cast Brass, Tiebout's.....50%

Cast Iron—

Fast Joint, Broad.....50 @ 50 & 10%
Fast Joint, Narrow.....50 @ 50 & 10%
Loose Joint.....70 & 5 @ 70 & 10%
Loose Pin.....70 & 5 @ 70 & 10%
Mayer's Hinges.....70 & 5 @ 70 & 10%
Parliament Butts.....70 & 5 @ 70 & 10%

Wrought Steel—

Table and Back Flaps.....75%
Narrow and Broad.....75%
Inside Blind.....75 & 10%
Loose Pin.....75%
Loose Pin, Ball and Sledge Tip.....80 & 20%
Japanned, Ball Tip Butts, 70 & 10%
Bronzed Wrt. Nar. and Inside Blind Butts.....55 & 10%
Extra 10 @ 10 & 10%

Cages, Bird—

Hendryx, Brass:
3000, 5000, 1100 series.....5%
1200 series.....33 1/2%
200, 300, 600 and 800 series.....40 & 10%
Hendryx Bronze:
700, 800 series.....40 & 10%
Hendryx Enameled.....40 & 10%

Calipers—See Compasses.

Calks, Toe and Heel—

Blunt, 1 prong.....per lb. 4 @ 4 1/4%
Sharp, 1 prong.....per lb. 4 1/2 @ 4 3/4%
Perkins' Blunt Toe.....cents, \$ 8.35
Perkins' Sharp Toe.....cents, \$ 4.15

Can Openers—See *Openers, Can***Cans, Milk—**

	5	8	10 gal.
Illinois Pattern, \$1.50	2.00	2.25	each.
Iowa Pattern	2.35	2.50	each.
New York Pattern	2.60	3.00	qts.
Baltimore Pattern	1.50	2.00	each.

Cans, Oil—

	5	10 gal.
Buffalo Family Oil Cans:		
\$48.00	44.20	129.50 gross, net

Caps—Perfection—

Eley's E. B.	60c
G. D.	per M 34@35c
F. L.	per M 40@45c
G. E.	per M 60@65c
Musket.	per M 60@65c

Primers—

Berdan Primers, \$2.00 per M.	20c
B. L. Caps (Sturtevant Shell)	\$2.00 per M.
All other primers per M.	\$1.50@2.10

Cartridges—

Blank Cartridges:	
38 C. F., \$5.50	10c
38 C. F., \$7.00	10c
32 cal. Rim, \$1.50	10c
32 cal. Rim, \$2.75	10c
B. B. Caps, Con. Ball Sngl.	\$1.90
B. B. Caps, Round Ball	\$1.40
Central Fire	25c
Target and Sporting Rifle	15c
Primer Shells and Bullets	15c
Rim Fire Sporting	50c
Rim Fire Military	15c

Cases, Show—

Sun, No. 102, Silen: Salesman, 6 ft.	\$25.00
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Casters—

Bed.	70@70c10%
Plate	60@60c5%
Philadelphia	75@75c10%
Boss	70@70c10%
Boss Anti-Friction	70@70c10%
Martin's Patent (Phoenix)	45c
Smith & Hemenway Co.	30c
Standard Ball Bearing	45c
Tucker's Patent low list.	30c

Cattle Leaders—See *Leaders, Cattle.***Chain, Coll—**

American Coll. Jobbers' Shipments:							
3-16	3/4	6-16	3/4	7-16	3/4	9-16	
8.50	5.50	4.40	4.00	3.80	3.70	3.65	
8 1/2	3/4	3/4		1 to 1 1/4 inch.			
3.60	3.55	3.50		3.40	per 100 lb.		

Forks—

Base Discounts Aug. 1, 1899, list:

Hay, 2 time.....	50¢10¢5%
Boys' & Fish, 3 time.....	50¢10¢5%
Hay & Boys, 3 time.....	60¢5%
Hay & Boys, 4 time.....	66¢5%
Champion Hay.....	66¢5%
Hay & Header, long 3 time.....	6%
Header, 4 time.....	65%
Barley, 4 & 5 time, Steel.....	60¢10¢5%
Manure, 4 time.....	60¢15¢5%
Manure, 5 and 6 time.....	66¢5%
Spading.....	70¢2½%
Potato Digger, 6 time.....	60¢10¢5%
Sugar Beet.....	40¢10%
Coke & Coal.....	40¢10%
Heavy Mill & Street.....	65%
Iowa Dig-Easy Potato.....	65%
Victor, Hay.....	60¢5%
Victor, Manure.....	60¢5%
Victor, Header.....	66¢5%
Champion, Hay.....	66¢5%
Champion, Manure.....	60¢10¢5%
Columbia, Hay.....	66¢5%
Columbia, Manure.....	70%
Columbia, Spading.....	70¢10%
Hawkeye Wood Barley 4 time ½ doz.	\$5.00; 6 time, \$5.00.
W. & C. Potato Digger.....	60¢12½%
Acme Hay.....	60¢10¢5%
Acme Manure, 4 time.....	60¢20¢7½%
Dakota Header.....	65¢15¢5%
Jackson Steel Barley.....	65¢15¢5%
Kansas Header.....	66¢5%
W. & C. Favorite Wood Barley 4 time, ½ doz., \$5.00; 6 time, \$6.00	

Fountains, Stock—

Double Dewey.....	½ doz. \$13.00
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Frames—Saw—

White, Straight Bar, per doz. 75¢@80¢	
Red, Straight Bar, per doz. \$1.00@1.25	
Red, Double Brace, per doz. \$1.40@1.50	

Freezers Ice Cream—

Qts... 2 3 4 6 8 10	
Best, \$1.15 1.65 1.95 2.40 3.30 4.00	
Good \$1.25 1.60 1.80 2.00 2.70 3.60	
Fair, \$1.00 1.10 1.30 1.75 2.30 2.95	

Fruit and Jelly Presses—

See Presses, Fruit and Jelly.	
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Fry Pans—See Pans, Fry.**Fuse—Per 1000 Feet.**

Hemp Fuse.....	\$2.60
Cotton Fuse.....	2.90
Single Taped Fuse.....	3.25
Double Taped Fuse.....	4.30
Triple Taped Fuse.....	5.00

Gates, Molasses and Oil—

Stebbins' Pattern.....	30¢5¢@80¢1¢5%
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Gauges—

Marking, Mortise, etc.....	50¢10¢5¢10¢10¢5%
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Chapin-Stephens Co.

Marking, Mortise, etc. 50¢10¢5¢10¢10¢5%	
Scholl's Patent.....	50¢10¢5¢10¢10¢5%
Door Hangers.....	5¢@6¢10¢
Fulton's Butt Gauge.....	30¢10¢
Stanley R. & L. Co.'s Butt & Babbet Gauge.....	20¢20¢10¢10¢
Wire, Brown & Sharpe's.....	25¢
Wire, Morse's.....	25¢
Wire P. S. & W. Co.....	30¢10¢

Gimlets—Single Cut—

Nail, Metal, Assorted, gro. \$1.40@1.51	
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Spike, Metal, Assorted, gro. \$2.80@3.50

Nail, Wood Handled, Assorted, gro. \$1.75@2.00	
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Spike, Wood Handled, Assorted, gro. \$4.25@4.50**Glass, American Window**

See Trade Report.	
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Glasses, Level—

Chapin-Stephens Co.....	60¢@60¢10¢10¢
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Glue—Liquid Fish—

Bottles or Cans, with Brush.....	25¢@50¢
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Cans (½ pts., pts., qts., ½ gal., gal.).....

International Glue Co. (Martin's).....	40¢10¢50¢
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Grease, Axle—

Common Grade.....	gro. \$1.50@1.50
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Dixon's Everlasting, in 10-lb. pails, ea. \$5.00

Dixon's Everlasting, in 10-lb. pails, ea. \$5.00	
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Grips, Nipple—

Perfect Nipple Grips.....	40¢10¢25¢
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Griddles, Soapstone—

Pike Mfg. Co.....	33¢@33¢10¢
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Grindstones—

Bicycle Emery Grinder.....	60¢50
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Bicycle Grindstones, each.....

Bicycle Grindstones, each.....	\$2.50@3.00
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Pike Mfg. Co.

Improved Family Grindstone.....	per inch, per doz. \$2.00
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Pike Mow Knife and Tool

Grinder, etc.....	\$4.00
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Texas Ball Bearing, mounted, Angle

Iron Frames.....	each, \$3.25
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Halters and Ties—

Web.....	42¢25
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Web and Leather Halters.....

Web and Leather Halters.....	70¢
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Web and Manila Rope Halters.....

Web and Manila Rope Halters.....	70¢
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Sisal Rope Halters.....

Sisal Rope Halters.....	60¢20
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Sisal Rope and Cotton Rope Ties.....

Sisal Rope and Cotton Rope Ties.....	60¢10¢
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Hammers—

Handled Hammers.....	40¢10¢40¢10¢10¢
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Handled Hammers.....

Handled Hammers.....	40¢10¢40¢10¢10¢
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Handled Hammers.....

Handled Hammers.....	40¢10¢40¢10¢10¢
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Handled Hammers.....

Handled Hammers.....	40¢10¢40¢10¢10¢
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Handled Hammers.....

Handled Hammers.....	40¢10¢40¢10¢10¢
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Riveting and Tinner's—

Sargent's C. S. New List.....	40¢10¢10¢40¢
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Heavy Hammers and Sledges—

Under 5 lb.....	1b 50¢
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Handles—

Axe, Pick, etc.....	4¢@50¢5%
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Agricultural Tool Handles—

Axe, Pick, etc.....	4¢@50¢5%
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Long Handles.....

Long Handles.....	45¢@50¢5%
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D Handles.....

D Handles.....	45¢@50¢5%
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Cross-Cut Saw Handles—

Atkins.....	40¢45¢
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Mechanics' Tool Handles—

Auger, assorted.....	gro. \$2.50@2.75
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Chisel Handles.....

Chisel Handles.....	gro. \$1.65@1.85
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Apple Tanged Firmer, gro. ass'd.

Apple Tanged Firmer, gro. ass'd.	\$3.40@3.65
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Hickory Tanged Firmer, gro. ass'd.

Hickory Tanged Firmer, gro. ass'd.	\$3.15@3.40
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Apple Socket Firmer, gro. ass'd.

Apple Socket Firmer, gro. ass'd.	\$1.75@1.95
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Hickory Socket Firmer, gro. ass'd.

Hickory Socket Firmer, gro. ass'd.	\$1.45@1.60
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Hickory Socket Framing, gro. ass'd.

Hickory Socket Framing, gro. ass'd.	\$1.60@1.75
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File, assorted.....

File, assorted.....	gro. \$1.30@1.40
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Hammer, Hatchet, Axe, etc.....

Hammer, Hatchet, Axe, etc.....	5¢5%
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Hand Saw, Varnished, doz. 30¢@35¢

Hand Saw, Varnished, doz. 30¢@35¢	
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Not Varnished.....

Not Varnished.....	65¢@75¢
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Plane Handles.....

Plane Handles.....	Jack, doz. 50¢; Jack Bolted..... 75¢
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For, doz. 45¢; For, Bolted.....

For, doz. 45¢; For, Bolted.....	90¢
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Chapin-Stephens Co.

Chapin-Stephens Co.....	40¢40¢10¢
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Chisel.....

Chisel.....	65¢@65¢10¢
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File and Awl.....

File and Awl.....	65¢@65¢10¢
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Saw and Plane.....

Saw and Plane.....	40¢40¢10¢
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Screw Driver.....

Screw Driver.....	40¢40¢10¢
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Millers Falls Adj. and Hatchet Auger

Millers Falls Adj. and Hatchet Auger	Handles..... 15¢10¢
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Nicholson Simplicity File Handle

Nicholson Simplicity File Handle	½ gro. \$0.35@1.50
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Hangers—

Barn Door, New Pattern, Round	Groove, Regular:
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Inch.....

Inch.....	3 4 5 6 8
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Single Doz. \$0.90 1.25 1.60 1.95 2.50

Single Doz. \$0.90 1.25 1.60 1.95 2.50	
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Barn Door, New England Pattern,

Barn Door, New England Pattern,	Check Back, Regular:
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Inch.....

Inch.....	3 4 5 6
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Single Doz. \$1.30 1.85 2.50 3.00

Single Doz. \$1.30 1.85 2.50 3.00	
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Alfith Mfg. Co.

Alfith Mfg. Co.....	No. 1, Special, \$1.50 per doz. \$1.00
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Reliable No. 2.....

Reliable No. 2.....	per doz. \$15.00
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Chicago Spring Butt Co.

Chicago Spring Butt Co.....	Friction..... 25%
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Oscillating.....

Oscillating.....	25%
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Big Twin.....

Big Twin.....	25%
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Chisholm & Moore Mfg. Co.

Chisholm & Moore Mfg. Co.....	Baggage Car Door..... 30%
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Elaborator.....

Elaborator.....	50%
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Crone & Carrier Mfg. Co.

Crone & Carrier Mfg. Co.....	1 loose Axle..... 60%
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Roller Bearing.....

Roller Bearing.....	60¢10%
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Lane Bros. Co.

Lane Bros. Co.....	Roller Bearing..... \$4.15
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Parlor, Standard.....

Parlor, Standard.....	\$3.35
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Parlor, New Model.....

Parlor, New Model.....	\$2.85
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Parlor, New Champion.....

Parlor, New Champion.....	\$2.25
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Barn Door, Standard, 50¢10¢10¢5%

Barn Door, Standard, 50¢10¢10¢5%	
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Hinged.....

Hinged.....	\$6.40
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Covered.....

Covered.....	50¢10¢10¢
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Lawrence Bros. Co.

Lawrence Bros. Co.....	50¢10¢10¢5%
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Advance.....

Advance.....	40%
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Cleveland.....

Cleveland.....	60¢10%
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Crown.....

Crown.....	60%
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Giant.....

Giant.....	50¢10%
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New York.....

New York.....	60%
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Peoria.....

Peoria.....	60¢10%
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Sterling.....

Sterling.....	60%
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Swing, No. 95.....

Swing, No. 95.....	60%
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Union, No. 44, \$5.00; No. 45 \$7.00;

Union, No. 44, \$5.00; No. 45 \$7.00;	No. 46, \$9.00.
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McKinney Mfg. Co.

McKinney Mfg. Co.....	No. 1, Special, \$1.50 per doz. \$1.00
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No. 2, Standard, \$1.80.....

No. 2, Standard, \$1.80.....	per doz. \$15.00
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Hinged Hangers, \$1.10.....

Hinged Hangers, \$1.10.....	50%
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Meyers' Stayon Hangers.....

Meyers' Stayon Hangers.....	60%
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C. S. Smith Mfg. Co.

C. S. Smith Mfg. Co.....	Lundy Parlor Door..... 50¢10%
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Wire Goods Co:

Arame	60x105
Chief	70x105
Crown	70x105
Czar	70x105
V Brace	70x105
Czar Harness	50x105

Wrought Iron—

Box, 6 in., per doz.	\$1.00; 3 in., \$1.25;
10 in., \$2.50.	
Cotton	doz. \$1.05 to \$1.25

Miscellaneous—

Bush, Light, doz.	\$5.50; Medium,
\$6.00; Heavy, \$6.50	
Grass	No. 1 \$1.50 1.75 2.00
Best	doz. \$1.50 1.75 2.00
Common	doz. \$1.50 1.75 2.00
Potato and Manure	doz. \$1.50 1.75 2.00
Wh. fletres	doz. \$1.50 1.75 2.00
Hooks at a Eyes	doz. \$1.50 1.75 2.00

Brass	doz. \$1.50 1.75 2.00
Malleable Iron	doz. \$1.50 1.75 2.00
Covert Saddle Works Self Locking	doz. \$1.50 1.75 2.00
Gate and Door Hook	doz. \$1.50 1.75 2.00
St. Madison Cut-Down Corn Hooks	doz. \$1.50 1.75 2.00

Brass Hooks—See Bench Stops	
Corn Hooks—See Knives, Corn	
Horse Nails—See Nails, Horse	

Horseshoes—	
See Shoes, Horse.	

Hose Rubber—	
Garden Hose, 3/4-inch:	

Competition	ft. 4 1/2 @ 5 c
3-ply Standard	ft. 6 1/2 @ 7 c
4-ply Standard	ft. 7 1/2 @ 8 c
4-ply extra	ft. 8 1/2 @ 9 c
4-ply extra	ft. 10 @ 10 1/2 c
Cotton Garden, 3/4-in., coupled:	
Low Grade	ft. 6 @ 7 c
Fair quality	ft. 8 @ 9 c

Irons—Sad—	
From 4 to 10	lb. 3 @ 1 1/2 c
B. B. Sad Irons	lb. 3 1/2 @ 1 1/2 c
Chinese Laundry	lb. 4 1/2 @ 1 1/2 c
Chinese Sad	lb. 4 1/2 @ 1 1/2 c
Mrs. Potts', per set:	

Nos.	50	55	60	65
Japdops	71	68	81	78
Tin Tops	74	71	84	81
New England Pressing, lb.	3 1/2 @ 1 c			

Pinking—	
Pinking Irons	doz. 50 @ 60 c

Soldering—	
Soldering Coppers 2 1/2 and 3	19 @ 20 c
1 1/2 and 2	21 @ 22 c

Jacks, Wagon—	
Covert Mfg. Co.:	
Auto Screw	30 @ 55 c
Steel	30 @ 55 c
Covert's Saddle Works:	
Daisy	60 @ 10 c
Victor	60 @ 10 c
Lockport	50 @ 10 c
Lane's Steel	30 @ 10 c

Kettles—	
Brass, Spun, Plain	20 @ 25 c
Enamelled and Cast Iron—See Ware	
Hollow	

Knives—	
Butcher, Kitchen, &c.—	
Foster Bros' Butcher, &c.	30 @ 30 c
Smith & Hemenway Co.	40 @ 15 c
Wilkinson Shear & Cutlery Co.	30 @ 30 c
Hay and Straw—See Hay Knives	

Corn—	
Withington Acm, per doz.	\$2.65; Dent,
\$3.75; Adj. Rerrated, \$2.20; Rerated,	\$2.10; Yankee No. 1, \$1.50;
Yankee No. 2, \$1.15.	

Drawing—	
Standard List	70 @ 5 to 70 @ 10 c
Bratley's	35 @ 10 c
C. E. Jennings & Co. Nos. 45, 46, 60 @ 10 c	
Jennings & Griffin, Nos. 51, 52, 60 @ 10 c	
Swan's	70 @ 10 c
Watrous	10 @ 10 c
L. & J. J. White	20 @ 10 c

Hay and Straw—	
Lichtning	per doz. \$5.50 to \$7.00
Iwan's Sickle Edge	per doz. \$10.00
Iwan's Serrated	per doz. \$10.00
Maine	per doz. \$8.50

Mincing—	
Buffalo	per gro. \$13.00

Miscellaneous—	
Farriers	doz. \$3.00 to \$3.25
Woolenholms	per doz. \$3.00 to \$3.25

Knobs—	
Base, 3/4-inch, Birch, or Maple,	
Rubber tip, gro	\$1.10 @ 1.15
Carriage, Jap, all sizes	gro. 10 @ 1.50
Door, Mineral	doz. 65 @ 70 c
Door, Por. Jap'd	doz. 70 @ 75 c
Door, Por. Nickel	doz. \$2.00 @ 2.15
Bardley's Wood Door, Shutter, &c.	15 @ 1.50
Picture, Sargent's	60 @ 10 @ 10 c

Lacing Leather—	
See Belting Leather—	
Ladders, Step, Etc.—	
Myers Noisless Store Ladders	25 @ 25 c
J. & G. Mfg. Co., Low List	25 @ 25 c
P. S. & W.	50 @ 50 c
Reading	60 @ 60 c
Sargent's	40 @ 10 c

Lanterns—Tubular	
Regular Tubular No. 0, doz.	\$3.50 @ 4.75
Light Tubular, No. 0, doz.	\$4.75 @ 5.50
Hinge Tubular, No. 0, doz.	\$4.75 @ 5.50
Other Styles	10 @ 10 @ 10 c

Bull's Eye Police—	
No. 1, 2 1/2 inch	\$2.50 @ 2.75
No. 2, 3 inch	\$2.75 @ 3.00

Lasts and Stands, Shoe—	
Stowell's Atlas, Malleable Iron	30 @ 30 c
Stowell's Badger, Cast Iron	30 @ 30 c

Latches—

Thumb—	
Roggin's Latches, with screw	doz. \$5 @ 10 c

Leaders, Cattle—

Small	doz. 55c; large, 60c
Covert Mfg. Co.	45 @ 25 c

Lifters, Transom—

R & E.	33 @ 45 c
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Lines—

Wire Clothes, Nos., 18	19	30
100 feet	\$2.20	2.00 1.65
75 feet	\$1.30	1.70 1.30
Samson Cordage Works:		
Solid Braided Chalk, No. 0 to 3	40c	
Silver Lake Braided Chalk, No. 0, 60, 90, 0;		
No. 1, 60, 90; No. 2, 70, 00; No. 3, 75, 00		
per gr.	30c	
Anniston Waterproof Clothes, 50 ft., 7		
gro.; \$25.00; Gilt Edge, \$24.00; Air Line,		
\$24.00; Acme, \$19.00; Alabama, \$17.00;		
Empire, \$15.00; Advance, \$15.00; Ori-		
ole, \$22.00; Albemarle, \$15.00; Eclipse,		
\$13.50; Chicago, \$12.50; Standard,		
\$11.00; Columbia, \$9.50.		

Locks—Cabinet—

Cabinet Locks	3 1/2 @ 55 @ 7 1/2 c
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Door Locks, Latches, &c.—	
[Net prices are very often made on	
these goods.]	
Reading Hardware Co.	50c
R. & E. Mfg. Co.	40c
Sargent & Co.	40 @ 10 c
Stowell's Steel Door Latches	50c

Elevator—

Stowell's	50c
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Padlocks—

Wrought Iron	7 @ 10 @ 8 @ 5 c
R. & E. Mfg. Co. Wrt. Steel and Brass	75 @ 15 @ 10 c

Sash, &c.—

Ives' Patent	62 1/2 c
Bronze and Brass	50c
Crescent	50c
Iron	62 1/2 c
Wrought Bronze and Brass	55c
Wrought Steel	35c
Reading	net 50c

Machines—Boring—

Com., Upright, Without Augers	\$2.00
Com., Angular, Without Augers	\$2.25

R. & E. Mfg. Co.: Upright, Angular	
Improved No. 3, 4 1/2, 5	No. 1 \$3.00
Improved No. 4, 3 1/2	No. 2 3.38
Improved No. 5, 2 1/2	
Jennings', No. 4, 3 1/2	No. 1, 3.50
Millers' Falls	5.75
Snell's, Rice's Pat.	5.50 2.75

Corking—

Reisinger Invaluable Hand Power	per doz. \$48.00
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Fence—

Williams' Fence Machines	each, \$5.50
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Moore's Anti-Friction Differential Pul-	
ley Block	30c
Moore's Hand Hoist, with Lock Brake	30c

Ice Cutting—

Chandler's	15 @ 10 c
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Washing—

Boss Washing Machine Co.: Per doz.	
Boss No. 1; Boss Rotary	\$5.00
Boss No. 7; Dietz Rotary	\$6.00
Champion Rotary; Banner No. 1	\$5.00
Standard Champion No. 1	\$4.00
Standard Perfection	\$3.00
Clint Square Western	\$3.00
Uneda American, Round	\$2.00

Mallets—

Bickory	45 @ 50 c
Lignumvite	45 @ 50 c
Timbers, Hickory and Applewood,	
doz.	50 @ 55 c

Mats—Door—

Elastic Steel (W. G. Co.)	10c
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Mattocks—

See Picks and Mattocks,	
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Milk Cans—See Cans, Milk

Mills—Coffee, etc.—	
Enterprise Mfg. Co.	25 @ 30 c
National, list Jan. 1, 1902	30c
Parker's Columbia & Victoria	50 @ 10 @ 80 c
Parker's Box and Side	50 @ 10 @ 60 c
Sun. No. 100, 1 to mill	per doz. \$5.00
Swift, Lane Bros Co.	30c

Mowers, Lawn—

Net prices are generally quoted,	
Cheap	all sizes, \$1.50 @ 1.95
Good	all sizes, \$2.25 @ 2.50

Food.....	all sizes, \$2.25@2.50			
	10	12	14	16-inch
High Grade	4.25	4.50	4.75	5.00
Continental				

Nails—

Cut and Wire. See Trade Report.	
Wire Nails and Brads, Paupered.	
List July 30, 1899, 85c @ 10 @ 85c 10 @ 10c	
Hungarian, Finishino, Upholster-	
ers', &c. See Tacks.	

Horse—

Nos. 6 7 8 9 10	
A. C.	25 23 21 21 21 40 @ 5 c
Ausable	23 23 21 21 21 50 @ 10 c
C. B. K.	25 23 21 21 21 40c
Champion	26 25 24 24 24 50c
Clinton	19 17 16 15 14 30 @ 10 @ 5 c
Mauds.	25 23 21 21 21 50c
Putnam	23 21 20 19 18 30 @ 5 c
New	19 17 16 15 14 10 @ 10 c
American, Nos. 5 to 10, 7	10 @ 10 c
Jobbers' special brands, per lb.	8 @ 8 1/2 c

Picture—

1 1/2 2 2 1/2 3 3 1/2 in.	
Brass Head	1.50 1.00 1.00 1.00 gro.
Por. Head	1.10 1.10 1.10 1.10 gro.

Nippers, See Pliers and Nippers.	
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Nuts—

Cold Punched:	
Mfrs. U. S. Standard	
Square, plain	\$4.90 @ 5.07
Hexagon, plain	\$5.30 @ 5.30
Square, C. T. & R.	\$5.10 @ 5.20
Hexagon, C. T. & R.	\$5.70 @ 4.80

Hot Pressed:

Mfrs. U. S. or Nar. Gauge Stan'd.	
Square Blank	\$5.80 @ 5.90
Hexagon Blank	\$6.10 @ 6.50
Square Tapped	\$5.60 @ 5.70
Hexagon Tapped	\$6.20 @ 6.50

Oakum—

Best or Government	lb. 6 1/2 c
Navy	lb. 6 1/2 c
U. S. Navy	lb. 6 1/2 c
Plumbers' Spun Oakum	24c
In carload lots 1/2 lb. off f. o. b. New	
York	

Oil Tanks—See Tanks, Oil.

Oilers—

Brass and Copper	50 @ 10 c
Tin or Steel	70 @ 10 @ 75 c
Zinc	65 @ 10 c
Chase or Paragon:	
Brass and Copper	55 @ 10 @ 50 c
Tin or Steel	75 @ 75 @ 10 c
Zinc	65c
Malleable, Hammer's Improved, No. 1	\$3.50; No. 2, \$4; No. 3, \$4.40
Malleable, Hammer's Old Pattern,	
same list	50 @ 10 c
American Tube & Stamping Co.:	
Spring Bottom Cans	70 @ 70 @ 10 c
Tip Top	per doz. \$0.75
Railroad Oilers etc.	60 @ 60 @ 10 c

Openers—Can—

French	doz. 55c
Iron Handle	doz. 25 @ 27 c
Sprague, Iron Hdl.	per doz. 35 @ 40 c
Sardine Scissors	doz. 1.75 @ \$3.00
Marvel	per doz. \$1.25
National	50 @ 50 c
Stowell's Sprague	per doz. 35 @ 45 c
Tip Top	per doz. \$0.75
Triumph Shear	per gro. \$0.00

Nickel Plate—

per doz.	\$2.00
Silver Plate	per doz., \$4.00

Packing—

Asbestos Packing, Wick and Rope,	
1 1/2 @ 15c lb.	

Rubber—

Sheet, C. I.	8 @ 10 c
Sheet, C. O. S.	9 @ 13 c
Sheet, C. B. S.	10 @ 14 c
Sheet, Pure Gum	50 @ 65 c
Sh. of Red	40 @ 50 c
Jenkins' Standard, 7 1/2 @ 80c	25 @ 25 c

Miscellaneous—

American Packing	7 @ 10 c lb.
Cotton Packing	16 @ 50 c lb.
Italian Packing	16 @ 12 1/2 c lb.
Jute	6 @ 1 1/2 c lb.
Russia Packing	16 @ 11 c lb.

Pails—

Creemery	
S. & Co., with gauges, No. 1	\$0.25;
No. 2, \$0.50 per doz.	

Galvanized—

Price per doz.	
Quart.	10 12 14
Water, Regular	1.50 1.75 2.00
Water, Heavy	2.75 3.00 3.25
Fire, Rd. Bottom	2.30 2.60 2.80
Well	2.25 2.50 2.75

Pans—Dripping—

Standard List	60 @ 10 @ 60 @ 10 @ 5 c
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Fry—

Common Lipped:	
No. 1	1 2 3 4 5
Per doz.	\$0.85 1.00 1.10 1.30 1.50

Roasting and Baking—

Rezal, S. S. & Co., per doz. Nos. 5, \$4.50;</
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Stanley's Duplex..... 20@20@10@10
Woods' Extension..... 33@45

Poachers, Egg-

Buffalo Steam Egg Poachers, # doz.
No. 1, \$4.00; No. 2, \$3.00; No. 3,
\$1.00; No. 4, \$1.20..... 50%

Points, Glaziers-

Bulk and 1 lb. papers..... lb. 6 1/2 c
1/2 lb. papers..... lb. 6 1/2 c
1/4 lb. papers..... lb. 6 1/2 c

Pokes, Animal-

Pt. Madison Hawkeys..... # doz. \$3.25
Pt. Madison Western..... # doz. \$3.25

Police Goods-

Manufacturers' Lists..... 25@25@50
Tower's..... 25%

Polish-Metal-

Prestoline Liquid, No. 1 (1 qt.), # doz.
\$3.00; No. 2 (1 qt.), \$2.75..... 40%
Prestoline Paste..... 40@100

George William Hoffman
U. S. Metal Polish Paste, 3 oz. boxes,
doz. \$1.25; 1 lb. boxes, # doz. \$2.25;
U. S. Liquid, 8 oz. cans, # doz. \$1.25;
gr. \$1.20..... 10%

Barkeepers' Friend Metal Polish, # doz.
\$1.75; # gr. \$1.80..... 10%
Wynn's White Silk, 1/2 pt. cans, # doz.
\$2.00..... 10%

Stove-

Black Eagle Benzine Paste, 5 lb. cans..... 10%
Black Eagle Liquid, 1/2 pt. cans, # doz. 70%
Black Jack Paste, 1/2 lb. cans, # doz. 70%
Black Kid Paste, 5 lb. can..... 50%

Ladd's Black Beauty, # gr. \$1.00..... 50%
Joseph Dixon's, # gr. \$5.75..... 10%
Firestone Plumbago..... 10%
Gem, # gr. \$4.50..... 10%
Japanese, # gr. \$3.50..... 10%
Jet Black..... 10%
Peerless Iron Enamel, 10 oz. cans, # doz. \$1.50

Wynn's:
Black Silk, 5 lb. pail..... each 70%
Black Silk, 1/2 lb. box..... each 70%
Black Silk, 5 oz. box..... each 70%
Black Silk, 1/2 pt. liq..... each 70%

Poppers, Corn-

1 qt., Square..... gro. \$9.00
1 qt., Round..... gro. \$10.00
1 1/2 qt., Square..... gro. \$11.00
2 qt., Square..... gro. \$13.00

Post Hole and Tree Augers and Diggers-

See also Diggers, Post Hole, etc.

Posts, Steel-

Steel Fence Posts, each, 5 ft., 4 1/2 c; 6
ft., 45 c; 6 ft., 45 c..... 10%
Steel Hitching Posts, each..... \$1.30

Potato Parers-

See Parers, Potato.

Pots - Glue-

Enamelled..... 50%
Tinned..... 35%

Powder-

In Canisters:
Duck, 1 lb. each..... 45c
Fine Sporting, 1 lb. each..... 75c
Rifle, 1/2 lb. each..... 15c
Rifle, 1 lb. each..... 25c

King's Semi-Smokeless:
Keg (25 lb. bulk)..... 30.50
Half Keg (12 1/2 lb. bulk)..... 33.50
Quarter Keg (6 1/4 lb. bulk)..... 31.90
Case 24 (1 lb. cans bulk)..... 44.50
Half case 1 lb. cans bulk..... 44.50
King's Smokeless: Shot Gun Rifle
Keg (25 lb. bulk)..... \$12.00 \$15.00
Half Keg (12 1/2 lb. bulk)..... 6.25 7.75
Quarter Keg (6 1/4 lb. bulk)..... 3.25 4.00
Case 24 (1 lb. cans bulk)..... 14.00 17.00
Half case 12 (1 lb. cans bulk)..... 7.25 8.75
Robin Hood Smokeless Shot Gun..... 50@20%

Presses-

Enterprise Mfg. Co..... 30@25@
Sensible..... 35@45
2 qt., \$2.00; 4 qt., \$4.00; 10 qt., \$6.00 each.

Pruning Hooks and Shears-See Shears.**Pullers Nail-**

Cyclops..... 50%
Dually Improved Nail Puller..... 50%
Miller's Falls, No. 3, per doz. \$12.00..... 33@10%

Pearson No. 1, Cyclone Spike Puller,
each \$30.00..... 50%
Pearson, # doz. \$9.00..... 40@10%

Scranton, Case Lots:
No. 2 B (large)..... \$3.50
No. 3 B (small)..... \$3.50
Smith & Hemenway Co..... 60%

Diamond B, No. 2, case lots, # doz. \$6.00
Diamond B, No. 3, case lots, # doz. \$5.50
Eur-ki..... 50%
Glan, No. 1, # doz. \$18; No. 2, \$16.50;
No. 3, \$15..... 40%
Yankov..... 60%

Pulleys-Single Wheel-
Inch..... 2 1/4 3
Aviniz, # doz. \$0.55 \$1.15
Hay Fork, Swivel or Solid Eye..... 10%

Inch..... 2 1/4 3
Hot House, # doz. \$0.70 \$1.35
Inch..... 1 1/4 1 1/2
Screw, # doz. \$0.65 \$1.30
Inch..... 1 1/4 1 1/2
Side, # doz. \$0.30 \$1.25
Inch..... 1 1/4 1 1/2
Tackle, # doz. \$1.30 \$1.68 1.00

Weyl's:
Ceiling or End, Anti-Friction..... 60@10%
Dumb Waiter, Anti-Friction..... 60@10%
Electric Light..... 60@10%
Side, Anti-Friction..... 60@10%

Sash Pulleys-

Common Frame; Square or Round
End, per doz., 1 1/4 and 2 in., 10@10c
Auger Mortise, No Face Plate, per
doz. 1 1/4 and 2 in. 10@10c

Auger Mortise, with Face Plate, per
doz. 1 1/4 and 2 in. 10@10c
Acme..... 1 1/4 in., 1 1/2; 2 in., 1 1/2
Common Sense, 1 1/4 in. # doz. 15c;
2 in., 20c.

Fox-All-Steel, Nos. 3 and 7, 2 in. # doz. 50%
Grand Rapids All Steel Noiseless..... 50%
Ideal..... 70@35

No. 36, Troy, 1 1/4 in., 1 1/2; 2 in., 1 1/2
Star..... 1 1/4 in., 1 1/2; 2 in., 1 1/2
Tackle Blocks-See Blocks.

Pumps-

Cistern..... 60@60@10%
Pitcher Spout..... 80@80@5%
Wood..... 50@50@10%

Pump Leathers-
Plunger and Lower Valve-Per gro.:
Inch..... 2 1/4 2 1/2 2 3/4 3 1/4 3 1/2 3 3/4 4 1/4 4 1/2 4 3/4

Plunger Cup Leathers-Per 100:
Inch..... 2 1/4 2 1/2 2 3/4 3 1/4 3 1/2 3 3/4 4 1/4 4 1/2 4 3/4

Barnes Dbl. Acting (low list)..... 50@10%
Contractors' Rubber Diaphragm No. 2
R. & L. Block Co..... \$1.00
Daisy Spray Pump..... # doz. \$7.20

Flint & Walling's Fast Mail (low list)..... 55%
Flint & Walling's Pitcher Spout..... 10%
National Specialty Mfg. Co., Measur-
ing..... 30%

Mechanical Sprayer..... \$7.30
Myers' Pumps, low list..... \$7.30
Myers' Power Pumps..... 30%
Myers' Spray Pumps..... 50%

Punches-

Saddlers' or Drive, good, # doz. 65@70c
Spring, single tube, good quality..... \$1.75@2.00

Revolving (4 tubes)..... # doz. \$3.50@3.75
Bemis & Co. Cast Steel Drive..... 50%
Bemis & Co. Cast Steel Drive..... 55%
Bemis Spring Belt Punches..... 35@45

Lodi Spring Belt Punches..... 35@45
Morrell's No. 1 (A.B.C.) # doz. \$15.00
No. 2, # doz. \$22.50..... 50%

Nagules, each \$7.50..... 50%
Nagarsa Folded Punches..... 40%
Nagarsa Solid Punches..... 55@10%

Paragon Spring Belt Punches..... 35@45
Steel Screw, B. & K. Mfg. Co..... 30%
Tinner's Hollow, P. S. & W. Co. 35@35@5%
Tinner's Solid, P. S. & W. Co., # doz. \$1.44..... 60%

Rail-Barn Door, &c.-
Cast Iron, Barn Door; Flange Screw
Holes for Rod, Groove Wheels:
1/2 5/8 3/4 1 in.

Angular for Sq. Groove Wheels:
Small, Med. Large.
1 1/2 1 3/4 2 1/4 2 3/4 3 1/4 3 3/4 4 1/4 4 3/4 5 1/4 5 3/4 6 1/4 6 3/4 7 1/4 7 3/4 8 1/4 8 3/4 9 1/4 9 3/4 10 1/4 10 3/4 11 1/4 11 3/4 12 1/4 12 3/4 13 1/4 13 3/4 14 1/4 14 3/4 15 1/4 15 3/4 16 1/4 16 3/4 17 1/4 17 3/4 18 1/4 18 3/4 19 1/4 19 3/4 20 1/4 20 3/4 21 1/4 21 3/4 22 1/4 22 3/4 23 1/4 23 3/4 24 1/4 24 3/4 25 1/4 25 3/4 26 1/4 26 3/4 27 1/4 27 3/4 28 1/4 28 3/4 29 1/4 29 3/4 30 1/4 30 3/4 31 1/4 31 3/4 32 1/4 32 3/4 33 1/4 33 3/4 34 1/4 34 3/4 35 1/4 35 3/4 36 1/4 36 3/4 37 1/4 37 3/4 38 1/4 38 3/4 39 1/4 39 3/4 40 1/4 40 3/4 41 1/4 41 3/4 42 1/4 42 3/4 43 1/4 43 3/4 44 1/4 44 3/4 45 1/4 45 3/4 46 1/4 46 3/4 47 1/4 47 3/4 48 1/4 48 3/4 49 1/4 49 3/4 50 1/4 50 3/4 51 1/4 51 3/4 52 1/4 52 3/4 53 1/4 53 3/4 54 1/4 54 3/4 55 1/4 55 3/4 56 1/4 56 3/4 57 1/4 57 3/4 58 1/4 58 3/4 59 1/4 59 3/4 60 1/4 60 3/4 61 1/4 61 3/4 62 1/4 62 3/4 63 1/4 63 3/4 64 1/4 64 3/4 65 1/4 65 3/4 66 1/4 66 3/4 67 1/4 67 3/4 68 1/4 68 3/4 69 1/4 69 3/4 70 1/4 70 3/4 71 1/4 71 3/4 72 1/4 72 3/4 73 1/4 73 3/4 74 1/4 74 3/4 75 1/4 75 3/4 76 1/4 76 3/4 77 1/4 77 3/4 78 1/4 78 3/4 79 1/4 79 3/4 80 1/4 80 3/4 81 1/4 81 3/4 82 1/4 82 3/4 83 1/4 83 3/4 84 1/4 84 3/4 85 1/4 85 3/4 86 1/4 86 3/4 87 1/4 87 3/4 88 1/4 88 3/4 89 1/4 89 3/4 90 1/4 90 3/4 91 1/4 91 3/4 92 1/4 92 3/4 93 1/4 93 3/4 94 1/4 94 3/4 95 1/4 95 3/4 96 1/4 96 3/4 97 1/4 97 3/4 98 1/4 98 3/4 99 1/4 99 3/4 100 1/4 100 3/4 101 1/4 101 3/4 102 1/4 102 3/4 103 1/4 103 3/4 104 1/4 104 3/4 105 1/4 105 3/4 106 1/4 106 3/4 107 1/4 107 3/4 108 1/4 108 3/4 109 1/4 109 3/4 110 1/4 110 3/4 111 1/4 111 3/4 112 1/4 112 3/4 113 1/4 113 3/4 114 1/4 114 3/4 115 1/4 115 3/4 116 1/4 116 3/4 117 1/4 117 3/4 118 1/4 118 3/4 119 1/4 119 3/4 120 1/4 120 3/4 121 1/4 121 3/4 122 1/4 122 3/4 123 1/4 123 3/4 124 1/4 124 3/4 125 1/4 125 3/4 126 1/4 126 3/4 127 1/4 127 3/4 128 1/4 128 3/4 129 1/4 129 3/4 130 1/4 130 3/4 131 1/4 131 3/4 132 1/4 132 3/4 133 1/4 133 3/4 134 1/4 134 3/4 135 1/4 135 3/4 136 1/4 136 3/4 137 1/4 137 3/4 138 1/4 138 3/4 139 1/4 139 3/4 140 1/4 140 3/4 141 1/4 141 3/4 142 1/4 142 3/4 143 1/4 143 3/4 144 1/4 144 3/4 145 1/4 145 3/4 146 1/4 146 3/4 147 1/4 147 3/4 148 1/4 148 3/4 149 1/4 149 3/4 150 1/4 150 3/4 151 1/4 151 3/4 152 1/4 152 3/4 153 1/4 153 3/4 154 1/4 154 3/4 155 1/4 155 3/4 156 1/4 156 3/4 157 1/4 157 3/4 158 1/4 158 3/4 159 1/4 159 3/4 160 1/4 160 3/4 161 1/4 161 3/4 162 1/4 162 3/4 163 1/4 163 3/4 164 1/4 164 3/4 165 1/4 165 3/4 166 1/4 166 3/4 167 1/4 167 3/4 168 1/4 168 3/4 169 1/4 169 3/4 170 1/4 170 3/4 171 1/4 171 3/4 172 1/4 172 3/4 173 1/4 173 3/4 174 1/4 174 3/4 175 1/4 175 3/4 176 1/4 176 3/4 177 1/4 177 3/4 178 1/4 178 3/4 179 1/4 179 3/4 180 1/4 180 3/4 181 1/4 181 3/4 182 1/4 182 3/4 183 1/4 183 3/4 184 1/4 184 3/4 185 1/4 185 3/4 186 1/4 186 3/4 187 1/4 187 3/4 188 1/4 188 3/4 189 1/4 189 3/4 190 1/4 190 3/4 191 1/4 191 3/4 192 1/4 192 3/4 193 1/4 193 3/4 194 1/4 194 3/4 195 1/4 195 3/4 196 1/4 196 3/4 197 1/4 197 3/4 198 1/4 198 3/4 199 1/4 199 3/4 200 1/4 200 3/4 201 1/4 201 3/4 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327 1/4 327 3/4 328 1/4 328 3/4 329 1/4 329 3/4 330 1/4 330 3/4 331 1/4 331 3/4 332 1/4 332 3/4 333 1/4 333 3/4 334 1/4 334 3/4 335 1/4 335 3/4 336 1/4 336 3/4 337 1/4 337 3/4 338 1/4 338 3/4 339 1/4 339 3/4 340 1/4 340 3/4 341 1/4 341 3/4 342 1/4 342 3/4 343 1/4 343 3/4 344 1/4 344 3/4 345 1/4 345 3/4 346 1/4 346 3/4 347 1/4 347 3/4 348 1/4 348 3/4 349 1/4 349 3/4 350 1/4 350 3/4 351 1/4 351 3/4 352 1/4 352 3/4 353 1/4 353 3/4 354 1/4 354 3/4 355 1/4 355 3/4 356 1/4 356 3/4 357 1/4 357 3/4 358 1/4 358 3/4 359 1/4 359 3/4 360 1/4 360 3/4 361 1/4 361 3/4 362 1/4 362 3/4 363 1/4 363 3/4 364 1/4 364 3/4 365 1/4 365 3/4 366 1/4 366 3/4 367 1/4 367 3/4 368 1/4 368 3/4 369 1/4 369 3/4 370 1/4 370 3/4 371 1/4 371 3/4 372 1/4 372 3/4 373 1/4 373 3/4 374 1/4 374 3/4 375 1/4 375 3/4 376 1/4 376 3/4 377 1/4 377 3/4 378 1/4 378 3/4 379 1/4 379 3/4 380 1/4 380 3/4 381 1/4 381 3/4 382 1/4 382 3/4 383 1/4 383 3/4 384 1/4 384 3/4 385 1/4 385 3/4 386 1/4 386 3/4 387 1/4 387 3/4 388 1/4 388 3/4 389 1/4 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Stanley's Duplex 20@20.14 Woods' Extension 33.94 Poachers, Egg— Buffalo Steam Egg Poachers, # doz. No. 1, \$4.00; No. 2, \$3.00; No. 3, \$1.00; No. 4, \$12.00..... 504 Points, Glaziers'— Bulk and 1 lb. papers..... lb. 64c 1/2 lb. papers..... lb. 64c 1/4 lb. papers..... lb. 64c Pokes, Animal— Ft. Madison Hawkeye..... # doz. \$3.25 Ft. Madison Western..... # doz. \$4.00 Police Goods— Manufacturers' Lists..... 25@35c Tower's..... 25c Polish—Metal— Prestolite Liquid, No. 1 (1 qt.), # doz. \$3.00; No. 2 (1 qt.), \$0.75..... 40c Prestolite Paste..... 40c George William Hoffman: U. S. Metal Polish, 3 oz. boxes, # doz. 50c; # gr. \$4.50; 1/2 lb. boxes, # doz. \$1.25; # gr. \$5.75..... 10c U. S. Liquid, 8 oz. cans, # doz. \$1.95; # gr. \$12.00..... 8c Barkeepers' Friend Metal Polish, # doz. \$1.75; # gr. \$18.00..... 10c Wynn's White Silk, 1/4 pt. cans, # doz..... \$2.00 Stov— Black Eagle Benzine Paste, 5 lb. cans..... 10c Black Eagle, Liquid, 1/4 pt. cans, # doz. 75c Black Jack Paste, 1/4 lb. cans, # doz. \$0.40 Black Kid Paste, 1/4 lb. cans, # doz. \$0.65 Ladd's Black Beauty, # gr. \$10.00..... 50c Joseph Dixon's, # gr. \$5.75..... 10c Bixon's Plumbago..... # gr. \$2.50 Firestone..... # gr. \$2.50 Gem, # gr. \$4.50..... 10c Japanese..... # gr. \$3.50 Jet Black..... # gr. \$3.50 Peerless Iron Enamel, 10 oz. cans..... # doz. \$1.50 Wynn's: Black Silk, 5 lb. pail..... each 70c Black Silk, 1/2 lb. box..... # doz. \$1.00 Black Silk, 5 oz. box..... # doz. \$0.75 Black Silk, 1/4 pt. liq..... # doz. \$1.00 Poppers, Corn— 1 qt. Square..... gro. \$2.00 1 qt. Round..... gro. \$1.00 1/2 qt. Square..... gro. 1.00 1/2 qt. Round..... gro. 1.00 Post Hole and Tree Augers and Diggers— See also Diggers, Post Hole, &c. Posts, Steel— Steel Fence Posts, each, 5 ft., 42c; 6 ft., 46c; 6 ft., 48c. Steel Hitching Posts, each..... \$1.30 Potato Parers— See Parers, Potato. Pots—Glue— Enamelled..... 40c Tinned..... 35c Powder— In Canisters: Duck, 1 lb. each..... 55c Fine Sporting, 1 lb. each..... 75c Rifle, 1/2 lb. each..... 15c Rifle, 1 lb. each..... 35c King's Semi-Smokeless: Half Keg (12 1/2 lb. bulk)..... \$3.50 Quarter Keg (6 1/4 lb. bulk)..... \$1.90 Case 24 (1 lb. cans bulk)..... \$8.50 Half case (1 lb. cans bulk)..... \$4.50 King's Smokeless Shot Gun Rifle: Half Keg (12 1/2 lb. bulk)..... \$3.25 Quarter Keg (6 1/4 lb. bulk)..... \$1.90 Case 24 (1 lb. cans bulk)..... \$8.50 Half case (1 lb. cans bulk)..... \$4.50 Robin Hood Smokeless Shot Gun..... 50c Presses— Fruit and Jelly— Enterprise Mfg. Co..... 20@35c Sawbush..... 35c 2 qt., \$2.00; 4 qt., \$4.00; 10 qt., \$6.00 each. Seal Presses— Morrill's No. 1, per doz. \$20.00..... 50c Pruning Hooks and Shears—See Shears. Pulleys—Single Wheel— Inch..... 3 3/4 3 1/2 1.15 Avening, doz..... \$0.55 3 1/2 1.15 Hay Fork, Swivel or Solid Eye..... doz., 4 in., \$1.15; 5 in., \$1.40 Inch..... 3 3/4 3 1/2 1.15 Hot House, doz..... \$0.70 3 1/2 1.15 Inch..... 1 1/4 1 1/4 3 1/4 Screw, doz..... \$0.15 1 1/4 3 1/4 Inch..... 1 1/4 1 1/4 3 1/4 Side, doz..... \$0.30 1 1/4 3 1/4 Inch..... 1 1/4 1 1/4 3 1/4 Tackle, doz..... \$0.30 1 1/4 3 1/4 Inch..... 1 1/4 1 1/4 3 1/4 Sawmill: Ceiling or End, Anti-Friction..... 60@10c Dumb Waiter, Anti-Friction..... 60@10c Electric Light..... 60@10c Shut-off..... 60@10c Sash Pulleys— Common Frame; Square or Round End, per doz. 1 1/4 and 2 in., 16@10c Auger Mortise, no Face Plate, per doz. 1 1/4 and 2 in., 16@10c Auger Mortise, with Face Plate, per doz. 1 1/4 and 2 in., 16@10c Common Sense, 1 1/4 in., 16@10c 2 in., 20c. Foz-All-Steel, Nos. 3 and 7, 2 in. # doz. 50c Grand Rapids All Steel Noiseless..... 50c Ideal..... 70c Niagara..... 1 1/4 in., 16@10c; 2 in., 19c No. 30, Troy..... 1 1/4 in., 14@10c; 2 in., 16c Star..... 1 1/4 in., 16@10c; 2 in., 19c Tackle Blocks—See Blocks. Pumps— Cistern..... 60@80c Pitcher Spout..... 80@80c Wood..... 60@80c Pump Leathers— Plunger and Lower Valve—Per foot: Inch..... 2 3/4 3 1/4 3 1/4 3 1/4 Inch..... 3 1/4 3 1/4 3 1/4 3 1/4 Inch..... 3 1/4 3 1/4 3 1/4 3 1/4 Plunger Cup Leathers—Per foot: Inch..... 2 3/4 3 1/4 3 1/4 3 1/4 Inch..... 3 1/4 3 1/4 3 1/4 3 1/4 Inch..... 3 1/4 3 1/4 3 1/4 3 1/4 Barnes Dbl. Acting (low list)..... 50@10c Contractors' Rubber Diaphragm No. 3 R. & L. Block Co..... \$1.00 Daisy Spray Pump..... # doz. \$7.50 Flint & Walling's Fast Mail low list..... 55c Flint & Walling's Fitcher Spon..... 40c National Specialty Mfg. Co., Measur- ing..... \$4.00 Mechanical Sprayer..... \$7.50 Myer's Pumps, low list..... 50c Myers' Power Pumps..... 50c Myers' Spray Pumps..... 50c Punches— Saddlers' or Drive, good, doz. 65@70c Spring, single tube, good quality..... \$1.75@2.00 Revolving (1 tubes)..... doz. \$3.50@3.75 Bemis & Call Co.'s Cast Steel Drive..... 50c Bemis & Call Co.'s Check..... 55c Benard Spring Belt Punches..... 35c Lodi Spring Belt Punches..... 50c Morrill's No. 1 (A.B.C.) # doz., \$15.00..... 50c No. 2, # doz. \$21.50..... 50c Hercules, Inch \$7.50..... 50c Niagara Hollow Punches..... 40c Niagara Solid Punches..... 55@10c Paragon Spring Belt Punches..... 50c Steel Screw & K. Mfg. Co..... 40c Tinner's Hollow, P. S. & W. Co. 35@55c Tinner's Solid, P. S. & W. Co., # doz..... \$1.44..... 60c Rail—Barn Door, &c.— Cast Iron, Barn Door; Flange Screw Holes for Rd. Groove Wheels: 1/2 in. 1/2 in. 1/2 in. 1/2 in. \$1.70 \$2.10 \$3.00 100 feet. Angular for Rd. Groove Wheels: Small, Med. Large. \$1.50 1.90 2.50 100 feet. Sliding Door, Iron Painted, 3 1/2@4 1/2 Sliding Door, Wrought Brass, 1 1/2 Allyth Mfg. Co. No. 1, Reliable Hanger..... 8c Track, # foot..... 10c Allyth Mfg. Co. No. 2, Reliable Hanger..... 10c Track, # foot..... 10c Cronk's Double Braced Steel Rail, # foot..... 35c Cronk's O. N. T. Rail..... 35c Lane's H. T. Track, # 100 ft., 1 in., \$8.70; 1 1/2 in., \$4.00. Lane's O. N. T., # 100 ft., 1 inch, \$3.00; 1 1/2 inch, \$3.70; 1 3/4 inch, \$4.00. Lane's Standard, 1 1/2 in., # 100 ft..... 4.00 Lawrence Bros., # ft. 1 1/2..... 60c Lawrence Bros., New York..... 60c McKinney's Hinged Hanger Rail..... 50c foot, 1 1/2..... 30c McKinney's None Better..... # ft. 30c McKinney's Standard..... # ft. 4c Myer's Stayon Track..... 50@10c Smith's Wrought Bracket, Plain..... 35c Smith's Special..... 45c Smith's Hinged Bracket, # ft. 1 1/2..... 50c Smith's Plain Steel..... 30c Smith's Milled Steel..... 45c Stowell's Cast Rail..... # ft. 1 1/2 Stowell's Steel Rail, Plain..... 25c Stowell's Wrought Bracket, 1 1/2 in..... # ft. 7c Swett's Hylor, per ft. 1 1/2..... 50@10c Swett's P. L. B. Steel Rail, # 100 ft. \$3.00 Rakes— Net Prices, Malleable Rakes: 10 13 14 16-tooth Shank..... \$1.50 1.60 1.75 1.85 Socket..... \$1.65 1.80 1.95 2.10 Steel Garden and Garden, Aug. 1, '09 List..... 70c Weldless Steel..... 70c Malleable Iron, Garden..... 70@10c Lawn Rake, a Metal Head, per doz. 24 teeth..... \$2.50@3.50 20 teeth..... \$2.50@3.50 Fort Madison Red Head Lawn..... \$3.50 Fort Madison Blue Head Lawn..... \$3.50 Jackson Lawn, 20 and 30 teeth, # doz., net, \$4.25 Kohler's: Lawn Queen, 20-tooth, # doz..... \$3.45 Lawn Queen, 24-tooth, # doz..... \$3.60 Paragon, 24-tooth, # doz..... \$2.75 Paragon
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Screws—Bench and Hand—

Bench, Iron, doz. 1 in. \$2.50@3.75;
1 1/4, \$3.00@3.75; 1 1/2, \$3.50@3.75
Bench, Wood, Bench, doz. 3/4, 30c@30c
Hand, Wood, doz. 3/4, 30c@30c
H. H. Mfg. Co., Hand, doz. 3/4, 30c@30c
Chapin-Stephens Co., Hand, doz. 3/4, 30c@30c
Coach, Lag and Hand Rail—
Lag, Common Point, list Oct. 1,
99, 75c@10c@10c
Coach and Lag, Gimlet Point, list
Oct. 1, 99, 75c@10c@10c
Hand Rail, list Jan. 1, '01, 60c@10c@10c

Jack Screws—

Standard List, 75c@10c@10c
Millers Falls, 50c@10c@10c
Millers Falls, Roller, 50c@10c@10c
P. S. & W., 50c@10c@10c
Sargent, 50c@10c@10c

Machine—

List Jan. 1, '98,
Flat or Round Head, Iron, 50c@10c@10c
Flat or Round Head, Brass, 50c@10c@10c

Set and Cap—

Set (Iron or Steel), 70c@10c@10c
Sq. Hd. Cap., 50c@10c@10c
Hex. Hd. Cap., 60c@10c@10c
Rd. or Filler Hd. Cap., 60c@10c@10c

Wood—

List July 23, 1903,
Manufacturers' printed discounts;
Flat Head, Iron, 75c@10c@10c
Round Head, Iron, 85c@10c@10c
Flat Head, Brass, 85c@10c@10c
Round Head, Brass, 85c@10c@10c
Flat Head, Bronze, 77c@10c@10c
Round Head, Bronze, 75c@10c@10c
Drive Screws, 87c@10c@10c

Scroll Saws—See Saws, Scroll.**Scythes—**

Per doz.
Clipper Pattern, Grass, \$1.25@3.50
Full Polished Clipper, \$4.75@5.50
Grain, \$7.00@7.50
Clipper, Grain, \$7.75@8.25
Weed and Bush, \$4.50@5.50

Seeders— Ralsin—

Enterprise, 25c@30c

Sets— Awl and Tool—

Brad Awl and Tool Sets;
Wood Hdl., 10 Awls doz. \$2.00@2.25
Wood Hdl., 14 Awls, 6 Tools,
doz. \$2.50@2.60

Aiken's Sets, Awl and Tools;
No. 30, 9 doz. \$1.00@1.10
Fray's Adj. Tool Hdl's, Nos. 1, \$1.21; 2,
\$1.18; 3, \$1.12; 4, \$1.05; 5, \$1.00;
C. E. Jennings & Co.'s Model Tool
Holders, 9 doz. \$1.00@1.10
Millers Falls Adj. Tool Hdl's, No. 1,
\$1.12; No. 4, \$1.12; No. 5, \$1.10; 15 doz.
Stanley's Escisor,
No. 1, \$7.50; No. 2, \$4.00; No. 3,
\$5.50; 9 doz. \$1.00@1.10

Garden Tool Sets—

Pt. Mad-on, Three Piece, Hoe, Rake
and Shovel, 9 doz. sets, \$3.00

Nail—

Square, per gro. \$1.25@2.50
Round, Blk. and Poi., assorted,
gro. \$1.80@2.00
Octagon, gro. \$1.50@3.75
Buck Brothers, 27c
Cannon's Diamond Point, 9 gr. \$1.25
Mayhew's, per gro. \$2.00
Snell's Corrugated, Cup Pt. per gro. \$7.50
Snell's Knurled, Cup Pt., per gro. \$7.50

Rivet—

Regular list, 70c@10c@10c

Saw—

Aiken's,
Genuine, 50c@10c
Imitation, 50c@10c
Atkin's,
Criterion, 40c
Adjustable, 40c
Bemis & Call Co.'s,
Cross Cut, 30c
Hammer, new Pat., 45c
Plate, 20c
Spring Hammer, 40c
Diston's Star and Monarch, 25c
Morrill's No. 1, \$15.00;
Nos. 3 and 4, Cross Cut, \$20.00;
No. 5, Mill, \$30.00;
No. 10, 11, 12, \$15.00;
No. 1 Old Style, \$10.00;
Special, \$16.25;
Giant Royal, Cross Cut, 9 doz. \$8.50
Royal, Hand, 9 doz. \$8.50
Taintor Positive, 9 doz. \$18.00

Shaving—

Fox Shaving Sets, No. 30, per doz. \$24.00 net

Sharpeners, Knife—

Chicago Wheel & Mfg. Co., 65c

Shaves Spoke—

Iron, doz. \$1.00@1.15
Wood, doz. \$1.75@2.00
Bailey's (Stanley R. & L. Co.),
30c@10c@10c

Chapin-Stephens Co., 30c@10c@10c
Goodell's, 9 doz. \$9.00, 15 doz. \$14.00
Wood's F1 and F2, 50c

Shears—

Cast Iron, 7 8 9 in.
Best, \$16.00 18.00 20.00 gro.
Good, \$13.00 15.00 17.00 gro.
Cheap, \$5.00 6.00 7.00 gro.

Straight Trimmers, etc.,
Best quality, Jap., 70c@10c@10c
Nickel, 60c@10c@10c
Fair qual. Jap., 80c@10c@10c
Nickel, 75c@10c@10c

Tailors' Shears, 40c@10c@10c
Aeme Cast Shears, 40c@10c@10c
Heinrich's Tailors' Shears, 30c
Wilkinson's Hedge, 1900 list \$3.00
Wilkinson's Branch, Lawn and Border,
60c

Wilkinson's Sheep, 1900 list \$3.00

Tinners' Snips—

Steel Blades, 20c@10c@10c
Steel Laid Blades, 40c@10c@10c
Forged Handles, Steel Blades, Berlin,
40c@10c@10c

Heinrich's Snips, 40c
Jennings & Griffin Mfg. Co.'s, 6 1/2 to 10
inch, 40c@10c@10c
Niagara Snips, 40c
P. S. & W. Co., 20c
Triumph Pipe Shear, 9 doz. 9.60

Pruning Shears and Tools—

Cronk's Grape Shears, 30c
Cronk's Pruning Shears, 30c
Diston's Combined Pruning Hook
and Saw, 9 doz. \$18.00
Diston's Pruning Hook, 9 doz. \$12.00

John T. Henry Mfg. Co.,
Pruning Shears, all grades, 40c@10c@10c
Orange shears, 50c@10c@10c
Grape, 40c@10c@10c
Tree Pruners, 75c
P. S. & W. Co., 30c@10c@10c

Sheaves—Sliding Door—

Stowell's Anti-Friction, 50c
Patent Roller Hatfield's, Sargent's list,
70c@10c@10c
Reading, 50c
R. & E. list, 30c
Wrightville Hatfield Pattern, 50c

Sliding Shutter—

Reading list, 50c
R. & E. list, 50c
Sargent's list, 50c@10c@10c

Shells— Shells, Empty—

Brass Shells, Empty;
First quality, all gauges, 60c@5c
Climax, Club, Rival, 10 and 12 gauge,
65c@5c

Paper Shells, Empty:

Aeme, Ideal, Leader, New Rapid,
Magic 10, 12, 16 and 20 gauge, 25c
Blue Rival, New Climax, Challenge,
Monarch, Deference, Repeater, Yellow
Rival, 10, 12, 13 and 20 gauge, 30c
Climax, Union, League, New Rival,
10 and 12 gauge, 25c
Climax, Union, League, New Rival,
14, 16 and 20 gauge, (\$7.50 list), 30c
Expert, Metal Lined and Pigeon, 10,
12, 16 and 20 gauge, 33c@5c
Robin Hood, Low Brass, 30c@10c
Robin Hood, High Brass, 30c@10c

Shells, Loaded—

Loaded with Black Powder, 40c
Loaded with Smokeless Powder,
medium grade, 40c@5c
Loaded with Smokeless Powder,
high grade, 40c@10c@10c

Robin Hood Smokeless Powder,
Robin Hood, Low Brass, 50c
Comets, High Brass, 50c@10c@10c

Shoes Horse, Mule, &c.—

F. o. b., Pittsburgh:
Iron, Nested, per keg \$3.85
Steel, Nested, per keg \$3.60
Burdens', all sizes, 9 doz. \$9.90

Shot—

Drop, up to B, 25-lb. bag, \$1.61
Drop, B and larger, per 25-lb. bag, \$1.85
Buck, 25-lb. bag, \$1.85
Chilled, 25-lb. bag, \$1.85

Shovels and Spades—

Association List, Nov. 15, 1903, 40c

Sieves and Sifters—

Hunter's Imitation, gro. \$10.50@11.00
Buffalo Metallic Blue, S. S. Co., gr.:
14x10 16x18 18x20
\$13.20 \$13.50 \$14.40

National Mfg. Co.,
Victor, per gro. \$12.00
Surprise, per gro. \$11.00
No Name, per gro. \$11.00
Shaver (Barber's Pat.) Flour Sifters,
9 doz., \$3.00, 90c

Sieves, Tin Rim—

Per dozen.
Mesh, 14 16 18 20
Black, full size, \$1.20 1.25 1.30 1.35
Plated, full size, \$1.30 1.35 1.40 1.45
Black, scant, \$6.95 1.00 1.05

Sieves, Wooden Rim—

Nested, 10, 11 and 12 inch.
Mesh 18, Nested, doz. \$0.90@0.95
Mesh 20, Nested, doz. 1.00@1.05
Mesh 24, Nested, doz. 1.30@1.40

Sinks—

Cast Iron—
Standard list, 60c@10c@10c
NOTE.—There is not entire uniformity
list used by jobbers.

Sinks, Wagon—

Cast Iron, 70c@10c@10c
Malleable Iron, 40c@10c@10c
Steel, 40c@10c@10c

Slates, School—

Factory Shipments.
"D" Slates, 40c@10c@10c
Noiseless Slates, 60c@5c@5c

Slaw Cutters—See Cutters.**Slicers, Vegetable—**

Sterling No. 10, \$2.00, 33c

Snaps, Harness—

German, 40c@10c@10c
Covert Mfg. Co.,
Derby, 20c@5c@5c
High Grade, 45c
Jockey, 40c@10c@10c
Trojan, 45c
Yankee, 45c@5c@5c
Yankee, Roller, 40c@10c@10c
Covert's Saddlery Works,
Crown, 60c
German, 60c
Model, 60c
Triumph, 60c
Onida Community,
Solid Patent, 60c@10c@10c
Sargent's Patent Guarded, 60c@10c@10c

Snaths—

Scythe, 40c

Snips, Tinners'—See Shears.**Spoons and Forks—****Silver Plated—**

Good Quality, 50c@10c@60c@5c
Cheap, 60c@60c@10c
International Silver Co.,
1847 Rogers Bros. and Rogers & Hamil-
ton, 40c@10c
Rogers & Bro. William Rogers Eagle
Brand, 50c@10c
Anchor Rogers Brand, 60c
Wm. Rogers & Son, 60c@10c
Simcox L. & Geo. H. Rogers Co.,
Silver Plated Flat Ware, 60c
No. 77 Silver Plated Ware, 60c@10c

Miscellaneous—

German Silver, 60c@60c@5c
Cartersburg Cutlery Co.,
Yukon Silver, 50c
Simcox L. & Geo. H. Rogers Co.,
German or Nickel Silver, Special list,
1c@10c

Tinned Iron—

Teas, per gro. 45c@5c
Tables, per gro. 90c@1.00

Springs— Door—

Gem (Coil), 20c
Star (Coil), 30c
Troy's Roll, 39 in., 9 doz. \$1.10
Victor (Coil), 50c@10c@10c

Carriage, Wagon, &c.

1 1/4 in. and Wider:
Black or 1/4 Bright, lb., 14c@5c
Bright, lb., 14c@5c
Painted Steel Springs:
1 1/2 x 2 1/2, 60c@55c
1 1/2 x 2 1/2, 60c@55c
1 1/2 x 2 1/2 and narrower, per pr.,
80c@55c

Sprinklers, Lawn—

Enterprise, 25c@20c
Philadelphia No. 1, 9 doz. \$12; No. 2,
\$15; No. 3, \$24, 90c

Squares—

Nickel plated, } List Jan. 5, 1907.
Steel and Iron, } 70c@10c@10c
Rosewood Hdl. Try Square and T-
Bevels, 60c@10c@10c
Iron Hdl. Try Squares and T-Bevels,
40c@10c@10c
Diston's Try Sq. and T-Bevels, 70c
Winterbottom's Try and Miter,
40c@10c@10c@10c

Squeezers— Lemon—

Wood, Common, gro., No. 0, \$6.25
@5.50; No. 1, \$6.25@5.50.
Wood, Porcelain Lined,
Cheap, doz. \$1.90
Good Grade, doz. \$1.25
Tinned Iron, doz. \$0.75@1.25
Iron, Porcelain Lined, doz. \$1.75

Staples—

Barbed Blind, lb. 6c@6c
Electricians', Association list, 80c@10c@10c
Fence Staples, See Trade Report.
Poultry Netting, Staples, per lb.,
34c@34c
Grand Crossing Tack Co.'s list, 80c@10c

Steels, Butchers'—

Dick's, 30c
Foster Bros., 30c
C. & A. Hoffmann's, 40c

Steelyards—

80c@30c@10c

Stocks and Dies—

Blacksmith's, 40c@10c@50c
Curtis Reversible Ratchet Die Stock, 25c
Derby Screw Plates, 25c
Gardner Die Stocks No. 1, 60c
Gardner Die Stocks, larger sizes, 40c
Green River, 25c
Lightning Screw Plate, 25c
Little Giant, 25c
Reece's New Screw Plates, 25c@30c

Stone—**Scythe Stones—**

Chicago Wheel & Mfg. Co.,
Gem Corundum, 10 inch, \$5.00 per
gro., 12 inch, \$10.00
Norfolk Scythe Stones:
Less than gro-s lots, 9 doz. \$9.00
One gro or more, 9 doz. \$7.20
Lots of 10 gro or more, 9 doz. \$6.00
Pike Mfg. Co., 1901 list:
Black Diamond S. S., 9 doz. \$12.00
Lamolle S. S., 9 doz. \$11.00
White Mountain S. S., 9 doz. \$9.00
Green Mountain S. S., 9 doz. \$9.00
extra Indian Pond S. S., 9 doz. \$7.50
No. 1 Indian Pond S. S., 9 doz. \$7.00
No. 2 Indian Pond S. S., 9 doz. \$4.50
Leader Med End S. S., 9 doz. \$4.50
Balance of 1901 list 30c

Oil Stones, &c.

Chicago Wheel & Mfg. Co., 1901 list:
Gem Corundum Oil, Double Grit, 50c
Gem Corundum Oil, Single or Double
Grit, 45c
Gem Corundum Oil, 30c
Gem Corundum Razor Hones, 30c
Pike Mfg. Co., 1901 list:
Arkansas Stone, No. 1, 3 to 5 in., \$2.50
Arkansas Stone, No. 1, 5 to 8 in., \$3.50
Ark. mas Slips No. 1, 40c
Lily White Washita 4 to 8 in., 60c
Rose Red Washita, 4 to 8 in., 60c
Washita Stone, Extra, 4 to 8 in., 50c
Washita Stone, No. 1, 4 to 8 in., 40c
Washita Stone, No. 2, 4 to 8 in., 30c
Lily White Slips, 90c
Rose Red Slips, 90c
Washita Slips, Extra, 80c
Washita Slips, No. 1, 70c
India Oil Stones (entire list), 3c@1c

Hindustan No. 1, Regular, 9c@5c
Hindustan No. 1, Small, 9c@5c
Axe Stones (all kinds), 9c@5c
Turkish Oil Stones, 4 to 8 in., 30c
Queer Creek Stones, 4 to 8 in., 30c
Queer Creek Slips, 50c
Sand Stone, 50c
Belgian, German and Swaty Razor
Hones, 30c
Natural Grit Carving Knife Hones,
9 doz., \$3.00
Quick Edge Pocket Knife Hones,
9 doz., \$3.00
Mounted Kitchen Sand Stone, 9
doz., \$1.50

Stoners— Cherry—

Enterprise, 25c@30c

Stops, Bench—

Millers Falls, 15c@10c
Morrill's, 9 doz. \$1.10, 50c
Morrill's, No. 2, \$12.50, 50c

Door—

Chapin-Stephens Co., 60c@60c@10c

Plane—

Chapin-Stephens Co., 3c

Straps— Box—

Cary's Universal, case lots, 20c@10c@10c

Hame—

Covert's Saddlery Works, 60c@10c

Stretchers, Carpet—

Cast Iron, Steel Points, doz. 55c@60c
Socket, doz. \$1.75
Excelsior Stretcher and Tack Hammer,
Combined, per doz. \$6.00

Stuffers, Sausage—

Enterprise Mfg. Co., 25c@25c@7c
National Specialty Mfg. Co., list Jan.
1, 1902, 30c@35c

Sweepers, Carpet—

National Sweeper Co., Per doz.
Loyal, Roller Bearing, Fancy Ve-
neers, \$25.00
Marion, Roller Bearing, regular
finishes, full Nickel, \$24.00
Marion Queen, Roller Bearing,
full Nickel, \$24.00
Monarch, Roller Bearing, Nickel, \$22.00
Monarch, Roller Bearing, Japanned, \$21.00
Transparent, Roller Bearing, Plate
Glass Top, Nickel, \$23.00
Monarch Extra, Roller Bearing,
(17-inch case), Nickel, \$36.00
Monarch Extra, Roller Bearing (17-
inch case), Japanned, \$33.00
National Queen, Fancy Veneers, \$27.50
Perpetual, Regular Bearings, Nickel, \$20.00
Perpetual, Regular Bearings, Japanned, \$18.00
NOTE.—Discount of 30c per dozen on
three-dozen lots. Discount of \$1 per
dozen on five-dozen lots.

Tacks, Brads, &c.—

List Jan. 15, '99,
Carpet Tacks, American, 90c@25c@5c

American Cut Tacks, 90c@25c@5c

Suedes Iron Tacks, 90c@25c@5c

Suedes Upholsterers' Tacks, 90c@25c@5c

Gimp Tacks, 90c@25c@5c

Lace Tacks, 90c@25c@5c

Trimmers' Tacks, 90c@25c@5c

Looking Glass Tacks, 70c@10c@10c

Bill Posters and Railroad Tack, 90c@25c@5c

Hungarian Nails, 90c@25c@5c

Common and Patent Brads, 80c@10c@10c

Trunk and Clout Nails, 80c@5c@5c

NOTE.—The above prices are for
straight weights, and an extra 5c is given
Star Weights, and an extra 10c 5c on
Standard Weights.

Miscellaneous—

Double Pointed Tacks, 90c and 6 tens

Steel Wire Brads, R. & E. Mfg. Co. 1c list,
50c@10c@5c

See also Nails, Wire.**Tanks, Oil—**

Emerald, S. S. & Co., 80-gal. \$3.25

Emerald, S. S. & Co., 80-gal., \$4.00

Queen City S. S. & Co., 80-gal., \$3.45

Queen City S. S. & Co., 80-gal., \$3.45

Tapes, Measuring—

American Asses' Skin, 40c@10c@50c
Patent Leather, 25c@30c@5c
Steel, 40

CURRENT METAL PRICES.

JANUARY 13, 1904.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL— Bar Iron from Store—

Refined Iron:	
1 to 1 1/4 in. round and square.....	@1.80
1 1/4 to 4 in. x 3/4 to 1 in.	@2.00
1 1/4 to 4 in. x 1 1/4 to 5-16.....	@2.00
Ang. or:	@2.00
3 in. x 1/2 n. and larger.....	2.15
3 in. x 3-16 in. and 3/8 in.	2.40
1 1/4 to 2 1/4 in. x 3/4 n.	2.05
1 1/4 to 2 1/4 in. x 3-16 in. and thicker.....	2.05
1 to 1 1/4 in. x 3-16 in.	2.10
1 to 1 1/4 x 3/8 in.	2.25
3/4 x 3/8 in.	2.35
3/4 x 1/2 in.	2.15
3/4 x 3-16 in.	2.05
Teas:	
1 in.	2.55
1 1/4 in.	2.35
1 1/2 to 2 1/2 in.	2.25
3 in. and larger.....	2.40
Beams.....	2.35
Channels, 3 in. and larger.....	2.35
Bands—1 1/4 to 6 x 3-16 to No. 8.....	2.30
"Harden's Best" Iron, base price.....	2.05
Burden's "H. B. & S. Iron, base price.....	2.85
"Inter".....	3.10
Norway Bars.....	3.25 to 3.75
Norway Shapes.....	3.75 to 4.25

Merchant Steel from Store—

Bessemer Machinery.....	1.85
Toe Calk, Tire and Sleigh Shoe.....	2.00 to 2.50
Best Cast Steel, base price in small lots.....	75

Soft Steel Sheets—

3/4 inch.....	2.30	No. 14.....	2.45
3-16 inch.....	2.30	No. 16.....	2.55
No. 8.....	2.40	No. 18.....	2.65
No. 10.....	2.35	No. 20.....	2.65
No. 12.....	2.40	No. 22.....	2.70

Sheet Iron from Store.

Black.

	One Pass, C. R.	R. G.
No. 14.....	2.45	Cleaned.
No. 16.....	2.55	2.40
No. 18 to 21.....	2.45	2.70
No. 22 to 24.....	2.70	2.80
No. 25 and 26.....	2.75	2.90
No. 27.....	2.80	3.00
No. 28.....	2.80	3.10
No. 29.....	2.90	3.20

Russia, Planished, &c.

Genuine Russia, according to assort- ment.....	11 1/2 to 14
Patent Planished.....	14 to 16; B, 16, net.

Galvanized.

Nos. 14 to 16.....	2.93
Nos. 18 to 20.....	3.17
Nos. 22 to 24.....	3.11
No. 26.....	3.66
No. 27.....	3.90
No. 28.....	4.15
No. 30.....	5.12
No. 30 and lighter, 36 inches wide, 25¢ higher.	

Foreign Steel from Store—

Best Cast.....	15
Extra Cast.....	20
Swaged Cast.....	10
Best Double Shear.....	15
Blister, 1st quality.....	19
German Steel, Best.....	10
2d quality.....	9
3d quality.....	8
Sheet Cast Steel, 1st quality.....	15
2d quality.....	14
3d quality.....	12
R. Muesel's "Special".....	46
"Titanic".....	19
Hobson's Choice XX Extra Best.....	35
Jessop Self Hardening.....	45
Seamans' "Nelson" Steel.....	40
Hobson's "Soho" Special Self-Hardening.....	43

METALS—

Tin—

Duty.—Pigs, Bars and Block. Free.	Per D
Banca, Pigs.....	30 1/2 to 30 3/4
Straits, Pigs.....	30 1/2 to 30 3/4
Straits in Bars.....	30 1/2 to 31

Tin Plates—

American Charcoal Plates.

Calland Grade:	
IC, 14 x 20.....	8.50
IX, 14 x 20.....	8.00
Melyn Grade:	
IC, 14 x 20.....	6.25
IX, 14 x 20.....	7.50
Altway Grad.....	
IC, 14 x 20.....	5.25
IX, 14 x 20.....	6.35

American Coke Plates—Bessemer—

IC, 14 x 20.....	108
IX, 14 x 20.....	\$4.40 to \$4.50
	\$5.50 to \$5.60

American Terne Plates—

IC, 20 x 25.....	\$8.60
IX, 20 x 25.....	\$10.60

Copper—

Duty: Pig, Bar and Ingot and Old Copper free.	
Manufactured, 9 1/2¢ lb.	

Ingot—

Lake.....	13 1/2 to 13 3/4
Casting.....	13 to 13 1/4

Sheet and Bolt—

October 22, 1903. Net
Prices, in cents per pound.
Sheet 32 x 60.

	Not wider than	Not longer than	And longer than	34 oz. & over, gold, sheet, 34 oz. to 44 oz. 25 to 30 lb.	34 oz. to 35 oz. 1/4 to 25 lb.	16 oz. to 24 oz. 15 1/2 to 18 1/2 lb.	14 oz. and 1 1/2 lb. 11 to 12 1/2 lb.	12 oz. and 1 1/2 lb. 9 to 11 lb.	10 oz. and 1 1/2 lb. 7 1/2 to 9 1/2 lb.	8 oz. and 9 oz. 6 1/2 to 7 1/2 lb.	Lighter than 8 oz.
1 in.	30	72	18	19	19	19	20	21	22	23	24
3/4	30	72	18	19	19	19	20	21	22	23	24
3/8	30	72	18	19	19	19	20	21	22	23	24
3/16	30	72	18	19	19	19	20	21	22	23	24
1/8	30	72	18	19	19	19	20	21	22	23	24
1/16	30	72	18	19	19	19	20	21	22	23	24
1/32	30	72	18	19	19	19	20	21	22	23	24
1/64	30	72	18	19	19	19	20	21	22	23	24
1/128	30	72	18	19	19	19	20	21	22	23	24
1/256	30	72	18	19	19	19	20	21	22	23	24
1/512	30	72	18	19	19	19	20	21	22	23	24
1/1024	30	72	18	19	19	19	20	21	22	23	24
1/2048	30	72	18	19	19	19	20	21	22	23	24
1/4096	30	72	18	19	19	19	20	21	22	23	24
1/8192	30	72	18	19	19	19	20	21	22	23	24
1/16384	30	72	18	19	19	19	20	21	22	23	24
1/32768	30	72	18	19	19	19	20	21	22	23	24
1/65536	30	72	18	19	19	19	20	21	22	23	24
1/131072	30	72	18	19	19	19	20	21	22	23	24
1/262144	30	72	18	19	19	19	20	21	22	23	24
1/524288	30	72	18	19	19	19	20	21	22	23	24
1/1048576	30	72	18	19	19	19	20	21	22	23	24
1/2097152	30	72	18	19	19	19	20	21	22	23	24
1/4194304	30	72	18	19	19	19	20	21	22	23	24
1/8388608	30	72	18	19	19	19	20	21	22	23	24
1/16777216	30	72	18	19	19	19	20	21	22	23	24
1/33554432	30	72	18	19	19	19	20	21	22	23	24
1/67108864	30	72	18	19	19	19	20	21	22	23	24
1/134217728	30	72	18	19	19	19	20	21	22	23	24
1/268435456	30	72	18	19	19	19	20	21	22	23	24
1/536870912	30	72	18	19	19	19	20	21	22	23	24
1/1073741824	30	72	18	19	19	19	20	21	22	23	24
1/2147483648	30	72	18	19	19	19	20	21	22	23	24
1/4294967296	30	72	18	19	19	19	20	21	22	23	24
1/8589934592	30	72	18	19	19	19	20	21	22	23	24
1/17179869184	30	72	18	19	19	19	20	21	22	23	24
1/34359738368	30	72	18	19	19	19	20	21	22	23	24
1/68719476736	30	72	18	19	19	19	20	21	22	23	24
1/137438953472	30	72	18	19	19	19	20	21	22	23	24
1/274877906944	30	72	18	19	19	19	20	21	22	23	24
1/549755813888	30	72	18	19	19	19	20	21	22	23	24
1/1099511627776	30	72	18	19	19	19	20	21	22	23	24
1/2199023255552	30	72	18	19	19	19	20	21	22	23	24
1/4398046511104	30	72	18	19	19	19	20	21	22	23	24
1/8796093022208	30	72	18	19	19	19	20	21	22	23	24
1/17592186044416	30	72	18	19	19	19	20	21	22	23	24
1/35184372088832	30	72	18	19	19	19	20	21	22	23	24
1/70368744177664	30	72	18	19	19	19	20	21	22	23	24
1/140737488355328	30	72	18	19	19	19	20	21	22	23	24
1/281474976710656	30	72	18	19	19	19	20	21	22	23	24
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1/4503599627370496	30	72	18	19	19	19	20	21	22	23	24
1/9007199254740992	30	72	18	19	19	19	20	21	22	23	24
1/18014398509481984	30	72	18	19	19	19	20	21	22	23	24
1/36028797018963968	30	72	18	19	19	19	20	21	22	23	24
1/72057594037927936	30	72	18	19	19	19	20	21	22	23	24
1/144115188075855872	30	72	18	19	19	19	20	21	22	23	24
1/288230376151711744	30	72	18	19	19	19	20	21	22	23	24
1/576460752303423488	30	72	18	19	19	19	20	21	22	23	24
1/1152921504606846976	30	72	18	19	19	19	20	21	22	23	24
1/2305843009213693952	30	72	18	19	19	19	20	21	22	23	24
1/4611686018427387904	30	72	18	19	19	19	20	21	22	23	24
1/9223372036854775808	30	72	18	19	19	19	20	21	22	23	24
1/18446744073709551616	30	72	18	19	19	19	20	21	22	23	24
1/36893488147419103232	30	72	18	19	19	19	20	21	22	23	24
1/73786976294838206464	30	72	18	19	19	19	20	21	22	23	24
1/147573952593676412928	30	72	18	19	19	19	20	21	22	23	24
1/295147905187352825856	30	72	18	19	19	19	20	21	22	23	24
1/590295810374705651712	30	72	18	19	19	19	20	21	22	23	24
1/1180591620749411303424	30	72	18	19	19	19	20	21	22	23	24
1/2361183241498822606848	30	72	18	19	19	19	20	21	22	23	24
1/4722366482997645213696	30	72	18	19	19	19	20	21	22	23	24
1/9444732965995290427392	30	72	18	19	19	19	20	21	22	23	24
1/18889465931990580854784	30	72	18	19	19	19	20	21	22	23	